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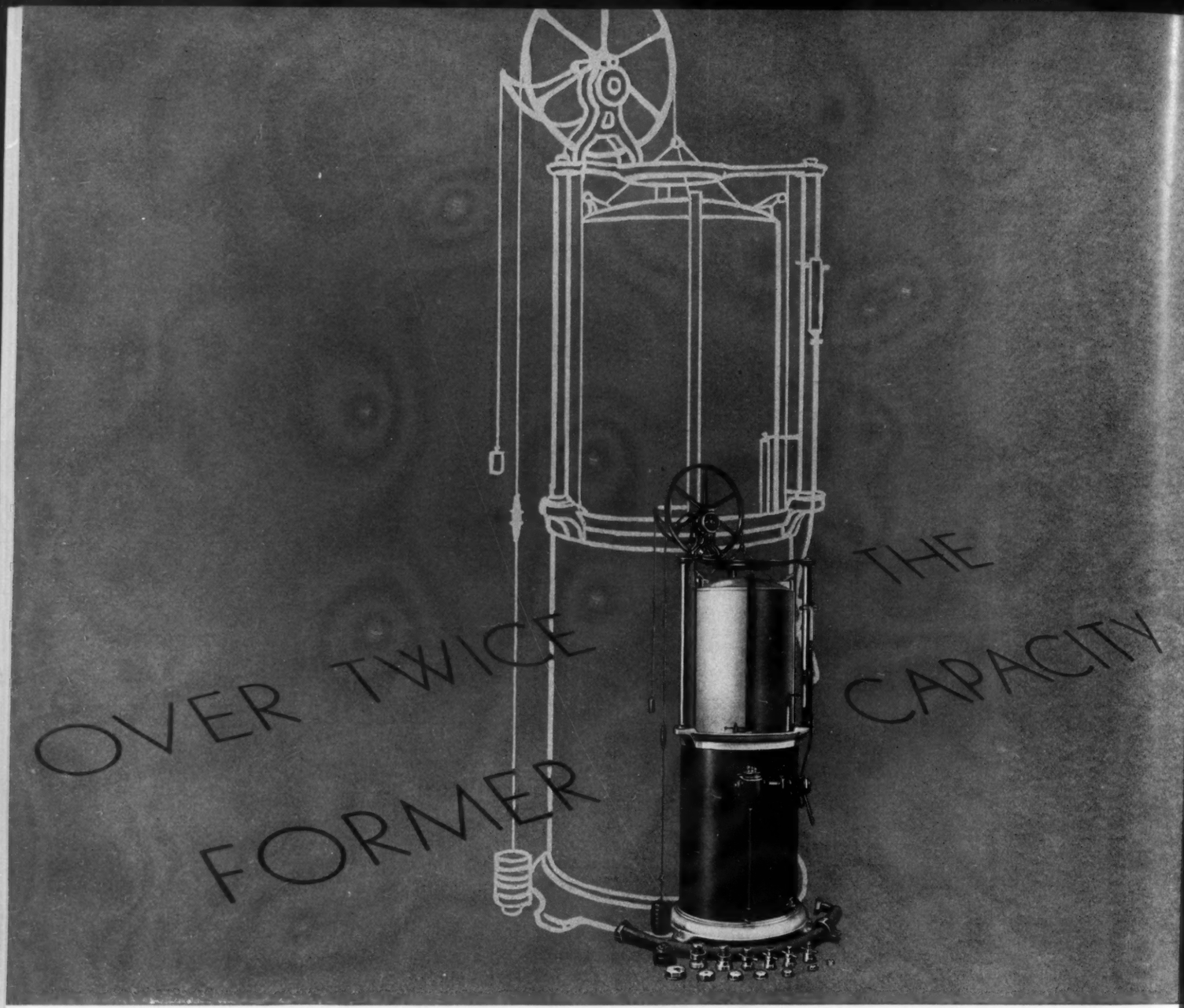

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WESTERN GAS

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Vol. IX, No. 12

A Monthly Journal of the Gas and Gas Appliance Industries in *Western America*

CLASS RATES

General Principles of This Type Rate, with Particular Reference to Special Rates in Central California

By B. B. BECKETT

Rate Engineer
Pacific Gas and Electric Company

MR. BECKETT'S discussion covers substantially the same ground as did his testimony before the California Railroad Commission, given during hearings in the Pacific Gas and Electric Co. rate case, September 27 and 28. His testimony was an introduction to the company's showing on the spread of rates, and is a very understandable exposition of the practical reasons for existing types of class rates. The present resume was delivered by the author before the annual organization conference of the Pacific Coast Gas Association at San Francisco, November 23 and 24.—*Editor.*

THE basic facts to be considered in rate-making are, first, the existing rates and their history; second, cost of service; third, value of the service to the consumer. With respect to class rates, a general rule relating these three elements is: new business which will not pay existing rates because its value to the consumer is too low, may be served at lower rates provided it is in a class which can be clearly defined and provided the additional revenue to be derived is something more than the additional cost.

This rule is the basis of all class rates. Such rates have been in use probably since the beginning of any public utility service. Perhaps class rates are better known in railroading than in other public utilities. It is generally understood that certain classes of commodities pay lower freight rates than other classes and that this difference is not due to any difference in the cost of hauling, but rather, to difference in the value of the service to the shipper. In other words, certain commodities generally of low market value in relation to their weight or bulk, would not move at all if charged first class commodity rates and, on the other hand, the railroad company could not make ends meet if it had to move all commodities at the low rates charged some classes.

The same rule has always been recognized in the electrical utility industry. Power rates are lower than lighting rates because power was taken onto existing systems on the basis of additional cost and in competition with isolated power plants. I do not mean by this that the cost of service for power may not be lower than for lighting—it generally is lower because of load factor and some other elements—but the primary reason that power rates are lower is that it was taken on as additional business and it is lower now primarily because it must be lower to compete with the isolated plant. Even in the domestic field cooking and heating by electricity was first added to existing lighting systems by the offer of low rates, usually on separate meter. Later, to save the expense of separate metering, combination service rates were substituted with appropriate blocks for the several classes of service thus offered through a single meter.

The principle of class rates in the gas business is somewhat more recent. In the manufactured gas industry, generally speaking, there was only one class available. This was originally lighting, but in recent years has been almost entirely cooking. Some attempt has been made even by manufactured gas companies to introduce rates for two other classes, namely, industrial use and house heating, but because the additional or increment cost in the manufactured gas industry is usually not much lower than the average cost, not much difference could be made in the rates offered these special classes. The natural gas industry, however, is different. The relation of additional cost to average cost more nearly approximates that in the electrical utility industry, and thus distinct class rates become desirable if all available business which may be served at some profit is to be served.

These principles have been relied upon as a guide in the rate-making of recent years in the gas department of the Pacific Gas and Electric Co. and there have been established four such class rates in addition to the general service schedule, as follows:

1. A surplus gas schedule; that is, a schedule available only on shut-off contract.
2. A commercial building heating schedule; that is, for gas used in heating commercial buildings.

3. A so-called firm industrial schedule, meaning a special schedule applicable to gas used in manufacturing and other industrial processes and not subject to shut-off.
4. A special schedule for large residential heating. This is a combination service schedule, that is, two classes on one meter with appropriate blocks to accommodate the two classes.

I shall take these up one at a time and explain in more detail the reasons why they are made just as they are, and in so doing I wish to show that they are not discriminatory or unfair, although there is a decided difference in the rate level, that is, in the average price paid per thousand cubic feet.

SURPLUS GAS RATES

Upon deciding to bring natural gas into the San Francisco Bay area in 1929, the company was confronted with the following situation. There were a number of isolated gas plants manufacturing gas for local distribution and there were a few inter-connecting transmission lines, such as that from San Francisco to San Jose, Sacramento to Woodland, and so forth. The rates were all of the simple block type, one schedule for each territory served by each respective plant. Gas was used almost entirely for cooking, but already two additional classes of business had been developed and were being served on the same block schedule, namely, domestic house heating and special industrial use, the latter only where the superior control possible with gas fuel, as compared with oil or coal, made the value of this service to the consumer high enough to warrant the much higher price of manufactured gas over other fuels on a heat unit basis.

It was realized that a very much larger volume of business was available in the industrial field if gas could be sold at a price equal to that of fuel oil on the heat unit basis. This meant a price around 15 cents per thousand cubic feet for 1150 B.t.u. gas. At the same time, it was realized that the additional cost of natural gas on a transmission pipe line already built, or about to be built, for other purposes was quite low and that there would be in such a pipe line a large amount of unused capacity in any event—this for the double reason, first, that the load for which the line was primarily built would have a rather low annual load factor and there must necessarily be a margin of spare capacity for emergency use, even during the peak load season; and, second, that the additional cost of a larger line is nowhere near proportional to the gain in carrying capacity.

Men were sent to Southern California to make a thorough study of practices there, and at the same time other men made a survey of potential fuel business in this territory. A summary of this survey was included in Exhibit 16, presented to the California Railroad Commission in November, 1929. This summary shows the total potential volume of fuel business, where gas might be substituted for fuel oil, a total of about 34 billion cubic feet per year as estimated for the third year of natural gas operation at that time. It was estimated that in this third year we would expect to supply about 27,250,000,000 cubic feet of this total. It is interesting to compare this with our actual sales of surplus gas in the last 12 months, namely, 19,800,000,000 cubic feet. We have fallen considerably short, due, no doubt, in part, at least, to the business depression which has affected the use of fuels in industrial plants, and also in our own electric plants.

Meanwhile rate studies were under way and full advantage was taken of experience gained by the Southern companies. Finally, it was decided in the interest of simplicity to establish in this territory only one class of surplus gas business, that is, business subject to shut-off in case of a shortage. By far the larger part of this would be boiler fuel. It was considered desirable that gas subject to shut-off should only be sold where the consumer could readily continue operation of his plant with fuel oil. Many consumers did not at first understand this principle and wondered why they could not get surplus gas for uses for which oil would not be suitable, meaning, of course, that oil could not be readily substituted for gas and, therefore, the plant would have to be shut down or be crippled in case we desired to recover this supply of gas for other consumers.

At first it was intended to leave the choice to the consumer, but we very early found the consumer quite willing to take a chance in order to get the cheap fuel. We believed it would not be in the public interest to establish the practice of selling gas subject to shut-off in cases where an obvious hardship would result, even if the consumer expressed a willingness to take the chance. And we also believed it would be inequitable and unfair to the rank and file of gas users who would pay the general service schedule, if we should permit those consumers who had heretofore used manufactured gas for industrial purposes to take advantage of the low rates offered under shut-off contract, since this class of business clearly was able to pay the full regular service rates and, under the general principles explained before, ought to do so.

I desire here to emphasize that the rule by which surplus gas is distinguished from other classes is one of use of the gas itself and not the kind of business in which the consumer is engaged.

Not until more than three years after the introduction of natural gas did we file any schedules for the sale of surplus gas on shut-off contract. During this period, we were feeling our way, so to speak, in this new field and preferred to file the individual contracts when and as made instead of attempting to formulate schedules which experience might soon prove faulty. Meanwhile we avoided any possible discrimination by establishing a standard basis of quotations for surplus gas in strict accordance with which all contracts were made. Consumers already under contract were given the benefit of reductions made from time to time in this standard basis. The simplest form of rate was adopted for these contracts, namely, the straight meter rate with a minimum annual charge, and the standard basis contained a table of such rates graduating downward from 40c to 14c in the S. F. Bay area as the minimum increased from $240.00 a year to $12,000 a year, with territorial differentials added according to the price of fuel oil available in each territory. As we were in direct competition with fuel oil, it was naturally the price of this fuel that governed the price of gas and a provision was included in each contract tieing the price of the two together on a straight B.t.u. basis. The graduation from 40c to 14c was worked out from experience, beginning with that already had in the Los Angeles region. In small quantities gas has certain advantages over oil that enable the consumer to pay a premium over the strict equivalent value on a B.t.u. basis. Here again it was the value of the service in competition with other fuels that determined the rate. No attempt was made to determine relative distribution costs except to see that each rate would yield something more than the additional cost.

Finally, last April, regular schedules were filed for surplus gas, one for each territory according to the price of fuel oil. In these schedules, the block meter form replaced the graduated scale of the standard basis, as the block form is simpler in application where a large number of consumers is to be accommodated on a single schedule. We now have a total of some 900 surplus gas consumers yielding an annual revenue of nearly $2,500,000 at an average rate of 15.5c.

COMMERCIAL BUILDING HEATING

At the outset, one striking difference had appeared between our territory and the Los Angeles region in the kind of new business that might be obtained for natural gas, namely, in the commercial

(Continued on Page 38)

Calculation *and* Determination *of the* Moisture Content *of* Compressed Natural Gas

By
ELMER G. HAMMERSCHMIDT

Chief Chemist
Texoma Natural Gas Co.
Fritch, Texas

PART I: DEVIATIONS FROM RAOULT'S LAW AND THE IDEAL GAS LAWS.

WHEN a gas which is in contact with water at some definite temperature and pressure has taken up as much water vapor as it can hold, a state of equilibrium exists, i.e. the number of molecules of water leaving the liquid are equal to the number of molecules of water vapor returning to the liquid. This condition of equilibrium is assumed when calculating the amount of water vapor in a gas at any given temperature and pressure and may be expressed by the relationship:

$$Py = px \qquad (1)$$

Nomenclature

f_P = fugacity of liquid water at total pressure P.
P = total absolute pressure on system, pounds per square inch.
p = normal vapor pressure of water at temperature t °F.
R = gas constant.
T = absolute temperature (t° + 460).
V = molal volume of water.
x = mol fraction of water in the liquid phase.
y = mol fraction of water in the vapor phase.
Z = compressibility factor of the gas at pressure P.

Equation 1 is usually accurate enough to be applied for engineering purposes in cases where the total pressure involved is relatively low. However, at higher pressures, the assumption of Raoult's Law and the ideal gas laws as incorporated in Equation 1, may lead to serious errors. Hence, a correction must be applied for the effect of total pressure on the fugacity of the gas and also the fugacity of the liquid. The fugacity may be considered as a corrected vapor pressure and it becomes equal to the vapor pressure when the vapor is an ideal gas. [1] Also, for all practical purposes, the value of x in Equation 1 may be considered as 1, since the amount of gas in solution is small in comparison with the amount of liquid.

Equation 1 may then be revised as follows:

$$ZPy = f_P \text{ or,} \qquad (2)$$

$$y = \frac{f_P}{ZP} \qquad (3)$$

f_P may be calculated by the following integrated Equation [1]:

$$\ln \frac{f_P}{p} = \frac{V}{RT}(P-p) \qquad (4)$$

For certain types of engineering calculations it is convenient to express the moisture content of a gas in terms of the weight of water per unit volume of water vapor-gas mixture such as pounds of water per million cubic feet of mixture. When the gas is saturated with water vapor, the composition expressed by this method is independent of both the nature of the gas and the total pressure but varies with the nature and temperature of the liquid. For example, an increase in the total pressure would decrease the volume per mol. of mixture but would correspondingly decrease the weight of vapor per mol. of mixture. [2]

The application of the above equations may be illustrated by the following example:

What is the moisture content of a saturated natural gas at 60°F. and 800 pounds per square inch absolute pressure? The compressibility factor is determined experimentally to be 0.8756.

Then in Equation (4):

V = 0.289 cubic feet per pound mol.
p = 0.2562 pounds per square inch at 60°F.
R = 10.71, and,

$$\ln \frac{f_P}{p} = \frac{0.289}{10.71 \times 520}(800-0.2562)$$

$$= 0.0415$$

$$\log \frac{f_P}{p} = \frac{0.0415}{2.3026} = 0.01803$$

$$\frac{f_P}{p} = 1.0424$$

$$f_P = 1.024 \times .2562$$

$$= 0.2671$$

Solving for y in equation 3.

$$y = \frac{0.2671}{0.8756 \times 800}$$

$$= 0.0003813$$

= 381.3 cubic feet of water vapor per million cubic feet of gas.

And, 1 cubic foot of water vapor at 60°F. and 14.65 pounds per square inch weighs 0.04736 pounds.

Therefore,

$381.3 \times 0.04736 = 18.1$ pounds of water per million cubic feet of gas.

If the above corrections are not applied, i.e. if the moisture content is calculated according to Equation 1, the calculated water content would be 15.2 pounds per million. It may be seen that an error of about 19 per cent is introduced for this particular case. For further comparison between corrected and uncorrected values, see Fig. 1 in which the broken line represents the 800 pounds per square inch curve to which no corrections have been applied.

Preparation of a Corrected Moisture Content Chart

In order to eliminate a large number of calculations, a chart in which the above mentioned corrections have been applied has been prepared according to

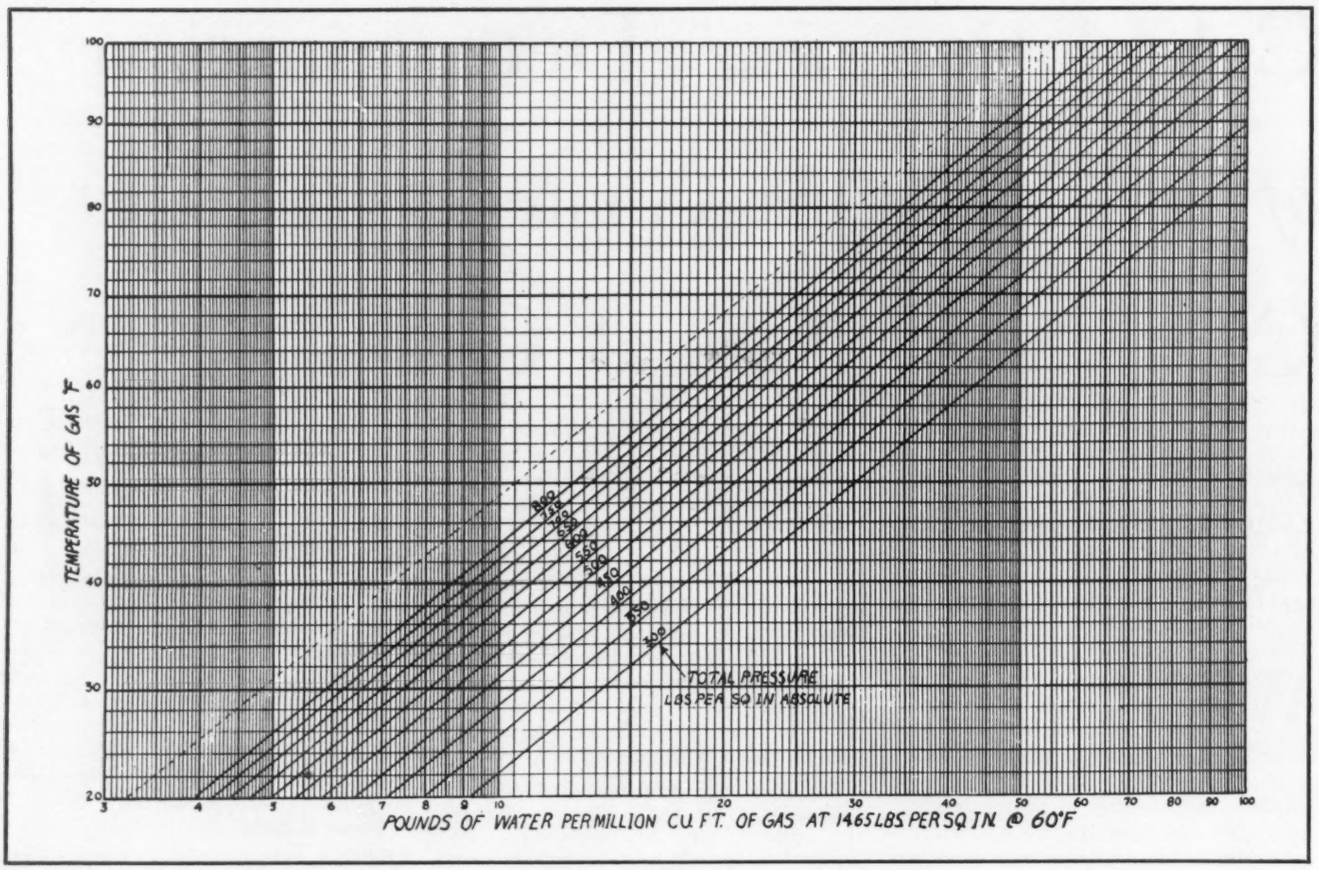


Fig. 1.

the Cox [2] method, which produces straight lines and hence only two points are required to draw the complete curve. An ordinary logarithmic scale is used for plotting the moisture content as pounds of water per million cubic feet. The temperatures are plotted as ordinates on a non-uniform scale which is prepared in the following manner:

After the logarithmic scale is prepared, any convenient straight reference line is drawn as shown by the broken line in Fig. 1. This line was adopted as the *uncorrected* curve at 800 pounds per square inch. The temperature scale is then laid out by means of Equation 1 (solve for y and convert to pounds per million). This calculation can be reduced to a single multiplication for the location of each horizontal or temperature line.

For example, to locate the 40°F ordinate:

$$\text{Lbs. water per million cubic feet} = \frac{47360\ p}{800} \text{ or } 59.2\ p$$
$$= 59.2 \times .1217 = 7.20$$

Now locate 7.2 on the logarithmic scale and extend vertically to the broken line. The point of intersection with the broken line at 7.2 pounds per million represents the 40°F. point and a horizontal line may be drawn through this point.

The chart in Fig. 1 has been checked against actual measurements of the moisture content of natural gas which was saturated with water vapor at a known temperature and pressure by means of the apparatus shown in Fig. 2. The results are shown in Table No. 1. Comparison of columns 3 and 5 will show that, for all practical purposes, almost perfect checks were obtained between the corrected calculated values and the values that were experimentally determined.

The method that was used for the experimental determination of the moisture content is described in Part II of this paper.

Compressibility factors which were used in the preparation of the chart in Fig. 1 were obtained by means of the Bean [3] type of apparatus. This chart should be applicable to any gas whose composition is similar to the gas as shown in Table No. 2, i.e. whose compressibility is the same as the gas in Table No. 2. For gases of widely different composition, it would be necessary to determine the compressibility factors and compute the data for a new chart as described above.

PART II. THE DETERMINATION OF THE MOISTURE CONTENT OF COMPRESSED NATURAL GAS.

Sampling

In order to measure the moisture content of a highly compressed gas, such as in a natural gas transmission line, it is essential that every possible precaution be taken to procure a sample that is representative of the conditions within the pipe line.

If the sample is removed directly from an ordinary tap connection along the pipe wall, there are a number of factors that may cause inaccuracies in the results:

1. Unless special means are provided for the removal of water from the natural gas in transmission lines, the inner walls of the pipe are at times coated with droplets of moisture. This condition is dependent upon a number of conditions within the pipe line as well as the ground temperature and atmospheric temperature. The moisture tends to move along into the sampling tap (due to the flow of gas through the pipe) and thus causes the resultant analysis to show results that are too high.

2. Expanding from line pressure to atmospheric pressure at the point where the sample is removed may cause suffi-

cient cooling (on the high pressure side) to cause some moisture to condense and thus vitiate results.

3. If the atmospheric temperature is lower than the temperature of the compressed gas, condensation will occur on the walls of the sampling pipe and thus lower results.

Moisture Content Determination; Chemical Method

The most accurate method for the determination of the moisture content in gases is usually considered to be the chemical method which consists of absorbing the moisture from the gas by means of an efficient dehydrating agent and weighing the amount of absorbed moisture.

The drying medium must be such that all of the moisture will be removed without absorbing any other constituent of the gas such as hydrocarbons or carbon dioxides. Dehydrite [4] (magnesium perchlorate trihydrate) or Anhydrone [5] [Anhydrous magnesium perchlorate-Mg $(ClO_4)_2$] have been found to be very suitable for this purpose.

The apparatus for removing a representative sample of gas from a pipe line which contains compressed gas together with the auxiliary absorption apparatus is shown in Fig. 3. The gas sample is removed through an ⅛-inch steel pipe (1) which is inserted through a gate valve and stuffing box arrangement (2) so that the sample is removed from near the central portion of the pipe line, (11). This arrangement permits the introduction of the sampling tube into the pipe line without the necessity of relieving the pressure on the line. That portion of the tube which is exposed to atmospheric temperature, is surrounded by a jacket (3) through which steam or other heated gases are passed. During the removal of the sample, the tube (1) is continuously purged by allowing a small quantity of gas to flow to the atmosphere at the bleeder valve (4). The sample for analysis is removed at valve (5) at which point the pressure is reduced from the full line pressure to approximately atmospheric pressure. (6) is a filter tube of glass wool to separate any entrained oil or dust particles. (7) is a mercury seal to hold constant pressure at pinch clamp (8) so that a constant flow of gas through the drying tubes (9) is insured. If a small amount of gas is allowed to bubble through the mercury at (7) the tube (6) will be purged at all times. Also, any changes in line pressures will affect the flow of gas through (5) although it will not affect the flow through (8) providing a small amount of gas is escaping through the mercury seal.

It is not always necessary to use the filter tube (6) as oil particles may not be present in the gas and scale ordinarily has precipitated upon the walls of the pipe or the apparatus before reaching the drying tubes. When possible, the drying tubes should be connected directly to valve (5) as there is some possibility of removing or adding moisture to the gas on passing through filter (6) even though the excess gas which passes through (6) and out at (7) tends to establish equilibrium conditions between the moisture in the gas and in the filter.

After passing through the drying tubes, the gas is metered at (10) by means of a small positive meter. Enough temperature and barometric readings are taken so that the metered gas can be corrected to a standard temperature and pressure base. (12) is a thermometer well for taking the temperature of the main line gas.

The improved Fleming absorption tube is a very convenient container for the dessicant. In this type of tube, mercury cups in the two ground glass stoppers automatically seal the inlet and outlet tubes, preventing absorption of moisture from the atmosphere during the process of removing tubes from apparatus and weighing. Two or three such tubes should be used in series. The second or third tube will serve as a check upon the completeness of moisture removal.

The tubes are weighed before and after passing the gas through, the increase in weight being regarded as the moisture content of the gas. An analytical balance capable of weighing to 0.1 milligram is used for weighing the tubes and a spare tube is used as a tare. The air should be removed from the tubes before weighing by purging with natural gas which is similar to that being tested, in order to avoid errors due to a change in specific gravity of gas within the tubes at the start and finish of a test.

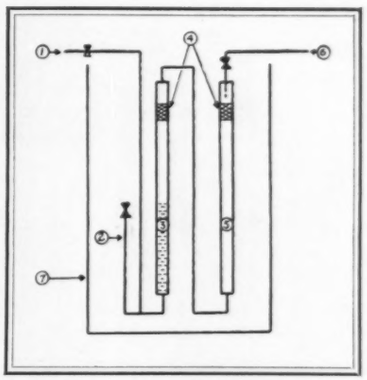


Fig. 2.

1. Gas inlet.
2. Tube for entering water to a fixed height in (3).
3. Water saturator tube.
4. Glass wool.
5. Mist extractor tube (filled with small pebbles).
6. Saturated gas outlet.
7. Constant temperature bath.

Dew Point Method of Moisture Content Determination

The apparatus shown in Fig. 4 was designed for the purpose of dew point determinations when the gas is at full line pressure. A standard brand of sight feed oil lubricator (1000 pounds per square inch working pressure) was slightly remodeled so that the inlet gas impinges directly upon the glass tube of the lubricator. The outlet gas is vented to atmospheric pressure through a small orifice which may be used as a flow indicator for control of the velocity of the gas that is in the glass tube. If the flow of gas through the apparatus is too high, the gas will not have sufficient time to reach the bath temperature, while if it is too low, an unreasonable length of time will be required to complete a determination. The apparatus is mounted in a 6- x 6- x 6-inch galvanized iron container one side of which contains a plate glass.

In making a dew point determination, the apparatus is thoroughly dried before the full pressure is placed on the apparatus. This can usually be accomplished by venting some compressed gas to nearly

(Continued on Page 29)

TABLE NO. 2.

	Mol. %
Carbon dioxide	0.20
Nitrogen residue	7.19
Methane	82.50
Ethane	5.99
Propane	3.26
Isobutane	0.30
N-Butane	0.49
Pentanes, plus	0.07
	100.00

TABLE NO. 1.

1 Test No.	2 Abs. Pressure of Saturator Lbs. per sq. in.	3 Temp. of Saturator	4 Determined Water content Lbs./Million	5 Dew point from Chart (obtained from data in columns 2 & 4)
1.	574	70.1	34.1	70.4
2.	567	69.0	32.9	69.0
3.	578	70.3	34.5	70.5
4.	580	69.7	33.1	69.5
5.	569	69.1	33.7	69.3

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 1.

Linden Station test connection showing pressure pump and recording gauge.

FIG. 2.

Test connection at Linden Station showing method of introducing water from fire hydrant.

FIG. 3.

Dead weight drop pressure apparatus and setting at Tulane Road Station.

Water Pressure Tests *for*

By B. B. LEGG

MANY high pressure gas transmission lines that once evaded populated areas, now find portions of themselves engulfed by the expansion of certain cities. This situation calls for more thorough testing of lines and following the safest practices possible in making the tests. To fulfill this requirement the Main Lines Department of The Ohio Fuel Gas Co. devised a new method of handling this work which was tried successfully for the first time in the summer of 1933.

Like most gas companies, it has been the practice of The Ohio Fuel Gas Co. to utilize the short-load, summer months to prepare its lines for the much heavier traffic of winter, and the higher pressures to be expected. All main lines are pressure-tested, usually at approximately 25 per cent above the maximum anticipated winter pressures.

Such tests usually locate the weak spots in the pipe line which would be likely to develop trouble during the coming winter. Any weaknesses usually manifest themselves in the form of blow-outs, sometimes splitting open one or two joints and completely blowing them from the ground. Using gas as the testing agent under pressure is very satisfactory in open country, but the method would be unsatisfactory where a high pressure line runs through a city or thickly congested area.

Most of the lines under the jurisdiction of the Main Lines Department lie in the open country, but one important 18-inch line lies for three or four miles of its length within the city limits of Columbus. At various locations along its route the areas are quite well built up and stress pressures testing with gas is not considered safe.

Several methods of testing this line were advanced, one being a pressure test with inert gases. It finally was decided to test it with water pressure as that would remove the dangerous element of pressure testing, although it would be considerably more expensive than testing with gas.

In preparing for the hydraulic test considerable preliminary work was necessary. A contour survey of the line was made and contour maps prepared, covering the 19,000 feet of the line which it was necessary to test. These maps showed the points at which it would be necessary to locate drips and blow-offs to relieve the gas displaced by the water, and remove any danger of water collecting in low points along the line. The connections for the drips and blow-offs were welded on with the electric arc-welding machine while pressure was on the line.

Test sections were made up, consisting of a joint of pipe, a blind plate welded in the middle of the joint and having a blow-off connection on each side of the blind plate, the proper thermometer wells and gauge connections. The line then was shut down at Linden Station and at Tulane Road Station, where the 18-inch line makes connection with three 12-inch lines to cross the Olentangy River, and the gas was removed. All connections in this length of line were removed and blind-plated. Test connections were installed at the two stations.

Arrangements were made with the Columbus Water Department to furnish the necessary water from a nearby fire hydrant, this water to be introduced into the line at Linden Station. It was calculated that 235,000 gallons would be needed to fill the cubical content of the line, this water to be furnished unmetered. In event of a leak and the necessity for the introduction of more water, the additional amount was to be introduced through a meter. A high-pressure pump capable of supplying 100 gallons a minute at 500 pounds pressure was procured for use during this test.

After the line was filled with as much water as the hydrant pressure of 35 pounds would force into it, the pump was connected and used to force the water until all gas was displaced.

More pressure then was applied to the line in several steps by means of the pump, going first to 200 pounds, then to 250, to 300 and then almost to 400 pounds. As shown by the chart, Fig. 4, some leakage was taking place. Over a

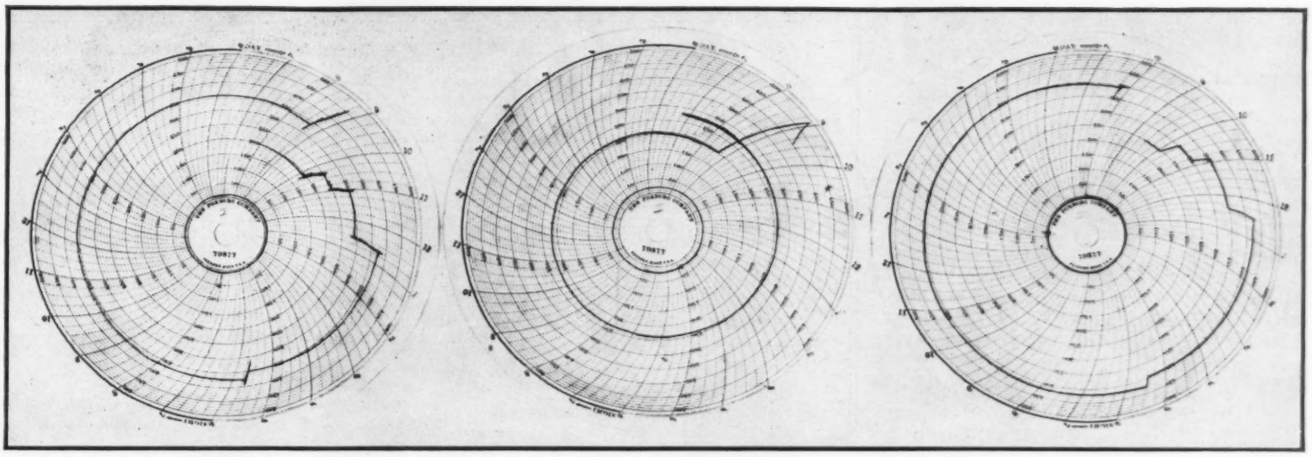


FIG. 4.

The chart in Fig. 4 shows the stages in pumping up the line at Linden Station after the pressure drop from 455 pounds to zero, which occurred almost immediately. The chart in Fig. 5 shows the drop in pressure after the break had been repaired, but before the two rust holes had been located.

FIG. 5.

FIG. 6.

Fig. 6 shows the difference in pressure between Tulane Road Station and Linden Station due to difference in elevation. Note that the chart in Fig. 6 starts out at 250 pounds, whereas the chart in Fig. 4 starts out at 200 pounds, showing a 50-pound difference in pressure.

Lines *in* Congested Areas

Superintendent—Main Lines
Ohio Fuel Gas Company

period of 15 hours the pressure dropped from 375 pounds to under 350 pounds the following morning. At this time the pump was started again and the pressure at Linden Station raised to slightly above 450 pounds, when a break occurred, as shown by the rapid drop in pressure on the chart. At the time of the break the sound was heard traveling along the pipe approximately 30 seconds before this break was reflected by a drop in pressure at the gauge.

The break was located and found to be the welded end of a header that was blown off completely. This header was on a double gate setting and, as a work order previously had been prepared for its removal, it was taken out at this time and replaced with a joint of pipe.

The test was resumed and the line again was filled with water to replace the amount lost during the blow-out. This water was metered. The pump was connected, pressure raised to 275 pounds and allowed to stand for 24 hours, during which time the pressure dropped 75 pounds.

The following morning the pump again was started and pressure raised. As soon as the pump was shut off considerable leakage was noted at some point as indicated by the rapid drop of pressure on the chart, Fig. 5. The leaks finally were located and found to be fairly large rust holes in the pipe. After repairing these leaks it was decided to remove the water and reintroduce gas for the location of possible additional leaks.

The elevation of Linden Station, where the water was introduced, is a little more than 100 feet higher than that of Tulane Road Station, which caused approximately 50 pounds difference in pressure due to the head of water.

The accompanying sketch (Fig. 7) shows the test sections used in testing the line. Section 1, containing the gate and by-pass connection for the introduction of both water and later gas, was sleeved into the line. This section was installed near Linden Station. No. 2 was installed in the line at the Tulane Road Station, and was similar to section 1, except that it had no by-pass. The 3-inch syphon drip on section 1 was made so that water could be removed that was trapped in the Linden end of the line by a slight rise about 1000 feet distant from the station.

To remove the water from the complete portion of the line that was under test it was necessary to open the 3-inch syphon drip at Linden Station and the

(Continued on Page 46)

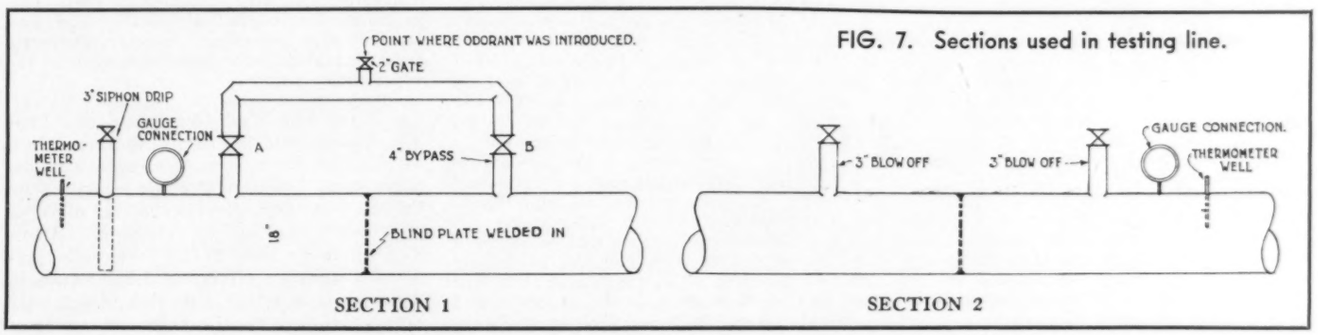


FIG. 7. Sections used in testing line.

Progress Summary on Substitute

MANUFACTURE of substitute gas for emergency and peak load use on natural gas systems has been accorded much attention during the past year, and considerable experimental work has been accomplished with the various processes thus far advanced.

Previous issues of *Western Gas* have made report on experimental progress with several processes, and on utilization tests with the resulting substitute gases, with particular reference to the manufacture of high B.t.u. oil gas on the Pacific Coast. The purpose of the present feature is to review developments in other sections of the country, where numerous plants have made preparations for substitute gas manufacture during the past summer and fall.

DENVER EXPERIENCE

One of the most important contributions to the growing fund of information on possibilities of high B.t.u. emergency gas comes from Denver, where a pipe line failure recently brought the stand-by plant into operation, as reported in the October issue. George Wehrle, superintendent gas department, Public Service Co. of Colorado, supplies the following comment upon the Denver experience. The table of results for the Refractory Screen Oil Gas Process was submitted for *Western Gas'* use by Alfred Johnson, chief engineer of Combustion Utilities Corp.

PUBLIC Service Co., of Colorado converted two 11-foot water-gas sets in its Denver plant to the Refractory Screen Oil Gas Process in June, 1933. Conversion of a similar unit is in prospect for the coming year.

George Wehrle

This process was developed by Combustion Utilities Corp. of New York for the purpose of providing a gas of high calorific value and of such composition that it could be substituted for natural gas in peak load or emergency operations without readjustment of customers' burners.

The conversion work required on an ordinary water-gas set consists of the replacement of grates in the generator with a refractory screen made of special heat-resisting material supported by suitable arches, oil burners in bottom and top of generator and top of carburetor, oil sprays in generator and carburetor, air blast piping to top of generator, miscellaneous steam and oil piping, gauges, meters, etc.

Fundamentally, the process is similar to carburetted water-gas operation with the coke or coal fuel bed ordinarily used replaced with a refractory screen. Oil is sprayed into the top of the generator and is cracked on the refractory screen where carbon is deposited as lamp black. Steam is admitted which reacts with a part of the carbon deposit to form blue gas. The gas leaving the generator is a mixture of blue gas and oil gas with a heating value of about 500 B.t.u. It is further enriched to 1000 B.t.u., or more, by carburetion in the usual manner. A portion of the lamp black deposited upon the refractory screen during a run is retained thereon and serves as fuel for heating the screen during the blast. The heat in carburetor and superheater is maintained by use of an oil burner in the top of the carburetor. The unit is brought to gas-making temperature by means of oil burners located in top and bottom of generator and top of carburetor. From three to four hours are required to heat the set to proper operating temperatures of 1600° F. to 1800° F. in generator and 1400° F. to 1500° F. in carburetor and superheater.

In Denver, a mixture of 50 per cent cracked gas oil and 50 per cent Bunker C fuel oil was used in all sprays and burners. The gas oil was 32-36° A.P.I. and the fuel oil 10-12°. The purpose of the fuel oil is to provide a requisite of 4 to 5 per cent Conradson carbon content for deposit on the refractory screen to maintain temperature equilibrium in the generator. When fuel oil was not used, a deficiency of carbon deposit required the use of the oil burner on the heating-up part of the cycle. The use of a straight fuel oil, or fuel oil mixture, in the generator and straight gas oil in the carburetor might be desirable provided dual oil systems are available. In Denver, this was not considered economical where the use was for emergency purposes only and a uniform mixture was used throughout the process. Fuel requirements of the Denver units for heating and gas-making purposes were established at 13.3 gallons of the mixture above described per million B.t.u. in the gas made.

During an actual emergency on September 9, 1933, caused by a washout of the pipe line supplying natural gas to Denver, the water-gas sets which had been converted to the Refractory Screen Process supplied all of the gas requirements of the city for a period of 42 hours. During this run, the thermal output in gas of the two 11-foot sets was established at 300 million B.t.u. per hour. The gas made was of uniform quality and was satisfactorily utilized in customers' burners, over the period above mentioned, without readjustment.

AT the Mid-West Gas School and Conference, held last month at Ames, Iowa, by the Mid-West Gas Association and the Engineering Extension Division of Iowa State College, stand-by processes were given a prominent place on the program. A. C. Rathkey of the Iowa Public Service Co. prepared a summary of current developments in the field, from which a number of selections are offered below. Only limited reference

TABLE OF RESULTS—REFRACTORY SCREEN OIL GAS PROCESS
(Based on Weighted Average of Commercial Performance)

Heating Value—B.t.u. per cu. ft.	1100	1000	900	800
Specific Gravity	0.740	0.682	0.631	0.579
Gas Analyses—				
Carbon dioxide—%	2.0	2.4	2.6	2.9
Illuminants	28.6	24.2	20.1	15.9
Oxygen	0.4	0.4	0.4	0.4
Carbon monoxide	5.4	6.6	7.7	8.8
Hydrogen	27.7	32.0	36.2	40.4
Methane	28.5	27.0	25.2	23.7
Ethane	4.9	4.4	3.8	3.4
Nitrogen	2.5	3.0	4.0	4.5
Naphthalene—Grs. per 100 cu. ft.		1.39		
Hydrogen Sulphide—Grs. per 100 cu. ft.		.80		
Organic Sulphur—Grs. per 100 cu. ft.		2.9		
Oil Requirements—No Tar Return—				
Fuel Oil—Gals. per M c.f.	4.63	5.17	5.72	6.18
Gas Oil—Gals. per M c.f.	7.60	6.25	4.95	3.60
Total Oil—Gals. per M c.f.	12.23	11.42	10.67	9.78
Oil Requirements—With Tar Return—				
Total Oil—Gals. per M c.f.	10.3	9.7	9.2	8.5
Steam—Lbs. per M c.f.	32.0	36.7	40.7	44.5
Tar—Gals. per M c.f.	1.95	1.74	1.54	1.30
Overall Thermal Efficiency	75.5	72.6	69.2	67.0

Basis of Figures—
Fuel Oil—12-18° A P I—Cracked Mid-Continent Residuum—0.7% sulphur
Gas Oil—34-38° A P I—Pennsylvania Gas Oil

to Pacific Coast experience is made in these excerpts, since lengthy report has been made upon this phase in earlier issues. Also, sections dealing with the Denver situation are deleted, this work being covered in Mr. Wehrle's foregoing discussion.

Quoting from Mr. Rathkey's summary:

MASON CITY

Last winter tests were conducted at Mason City, Iowa, using a regular carburetted water gas set without alterations. The results of this test are published in the 1933 Report of the Gas Production Committee of the American Gas Association.

The fuels used were coke and fuel oil during some of the tests and coke and gas oil during the balance of the tests. Experiments were made in making highly carburetted blue gas and also straight oil gas, using the generator only for making producer gas to be used in heating the checker brick.

After the proper operating conditions had been determined, the gas was distributed in Clear Lake, and no serious distribution troubles were encountered.

The tests resulted in the following conclusions which are quoted from the report:

1. Gas can be made in a standard carburetted water gas set without changes of gas and the temperatures at the bottom of superheater. Once this relation has been established and the desired outlet gas temperature determined for the particular quality of gas desired and for the particular oil used, very constant results can be obtained by operation in a combination temperature time cycle as follows:

   (a) Blast of sufficient length that the temperature at the bottom of the superheater reaches the desired maximum.

   (b) A run of definite time period with definite rate of oil and steam allowing time for a steam purge after shutting off the oil.

4. In making carburetted blue gas it is advisable to follow the same procedure as to cycle and temperatures as for straight oil gas, although a constant B.t.u. of gas can be made by varying the blue gas—oil gas ratio. Constant B.t.u. value is not in itself sufficient as the constituents of the gas are also important. The best operation as to constancy of gas is obtained by constant gas outlet temperature, and it is recommended that the temperature—time cycle be followed for this method also. It is necessary to determine the proper temperature of the outlet gas for each machine and each grade of oil. This temperature should be the highest temperature that can be used without lampblack production: in other words, the maximum cracking obtainable for the particular oil used without hydrogen production. This should give maximum oil efficiency, maximum methane production, and minimum production of illuminants possible without hydrogen production.

5. Proper operation will require two pyrometers. one located at the bottom of the superheater, and one in the connection between outlet of superheater and washbox. For best results a two-pen recording pyrometer showing the temperature at both points is recommended.

6. For blue gas—oil gas mix no changes of any kind are required to the set, unless for a particular plant it is found that the oil spray and pumps are too small to supply the required rate of oil flow, or other changes noted in footnote of paragraph 1.

7. For the production of straight oil gas it will be necessary to provide means for keeping the off-take pipe and washbox clear of lampblack if continuous operation is to be maintained, as during the tests there was an accumulation of lampblack sufficient to force shut-down after about five hours' run. The effect on this condition when using gas oil was not determined.

8. Straight oil gas can be substituted successfully with lower B.t.u. values than blue gas—oil gas mix, because of the lower specific gravity and lower percentage of illuminants.

9. Results of test indicate that the reduction in B.t.u. value due to compression and cooling is about the same for the two gases.

10. The capacity of the set when making straight oil gas (assuming provisions for disposal of lampblack, as mentioned above are made) is approximately 9 per cent less (on a volume basis) than the capacity of the set when using coal and producing 600 B.t.u. carburetted blue gas.

11. The capacity of the set when making blue gas—oil gas mix of approximately 1050 B.t.u. is approximately 3½ per cent greater than the set capacity when producing 600 B.t.u. carburetted blue gas.

Both of the above are based on using fuel oil for the high B.t.u. gas and gas oil for the 600 B.t.u. gas.

12. It is believed higher capacities may be realized with either method of operation when using gas oil instead of fuel oil.

CHICAGO

The results of intermittent operations over a period of several months in Chicago, during which time 800 B.t.u. gas was made to supply peak loads, are also included in the Production Committee report.

The fuels used were coke and 26-32 oil. About one-third of the oil was sprayed in the top of the generator, the balance being used in the carburetor.

The following is a summary as stated in the report:

1. 800 to 900 B.t.u. gas can be produced at the rate of approximately 160 M c.f. per (11 ft.) machine without undue difficulty.

2. A satisfactory operating cycle was used.

3. The B.t.u. contributed to the gas per gallon of oil is dependent on the quality of oil used, to a greater extent than the 520 B.t.u. operation.

4. The small amount of steam purge used at end of run did not purge out all of the oil gas between ash pan and generator blast valve, resulting in an explosion on each blast. Admitting the uprun steam in the blast line eliminated this condition.

(Continued on Page 34)

Production Gas

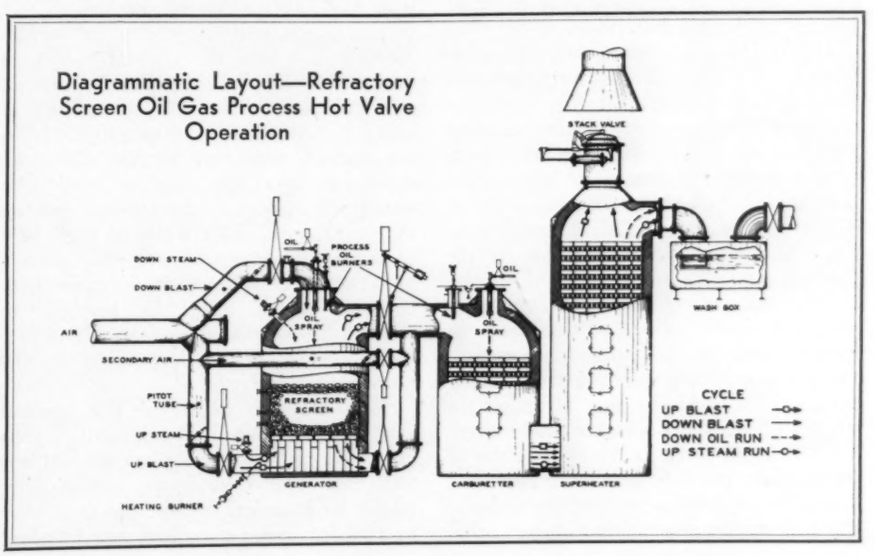
any kind, which will serve as a substitute for natural gas and will burn satisfactorily in any appliance properly adjusted for natural gas without changing the adjustment of the appliance, either when mixed with natural gas in any proportions or when substituted 100 per cent.

2. A satisfactory substitute for natural gas must contain not more than 35 per cent by volume of combined monoxide and hydrogen, and with these percentages must either

   (a) have approximately the same B.t.u. value and specific gravity as the natural gas, or

   (b) the heating value may be less than that of the natural gas if the specific gravity is sufficiently lower so that approximately the same B.t.u. delivery per hour through the burner orifice results.

3. The temperature of the gases leaving the set is the best indicator of the quality of the gas being produced. When making straight oil gas, this temperature variation is the only means of controlling B.t.u. and quality. The temperature of the gases leaving the set is the result of three possible variables, viz., temperature of brick at bottom of superheater, rate of oil input, and rate of steam input. For a given rate of oil and steam per minute definite relations will be found between the temperature of the outlet



Gas Fuel Endorsed *at* Low-Cost Housing Conference

By F. R. WRIGHT
American Gas Association Testing Laboratory

THAT part of the Federal Government's Recovery Program dealing with slum clearance and low cost housing is of special interest to the gas industry since gas is the logical fuel for cooking, heating, and refrigeration for consideration in such plans.

It is only logical that the National Conference on Low-Cost Housing should be held in Cleveland, since it was here that $12,000,000 was first appropriated for a group or apartment-building program of slum clearance, and further, a suburb of Cleveland was the first city to receive a $1,000,000 loan from the Federal Government for the construction of low cost homes. The conference, which was held from October 25 to 27 inclusive, attracted a very large group of building material manufacturers, architects, plumbers, heating engineers, and lighting specialists as well as other interested parties from many states.

The primary purpose of the conference was to determine what building material and domestic equipment manufacturers are doing and can do to provide for economical construction of group and individual low cost housing units. Since the type of heating, cooking, and refrigeration service to be provided is an essential consideration in a project of this kind, considerable time was spent in a discussion of such problems. This brings us to the highlights in the conference which appear to be of interest to the gas fraternity.

Henry Wright, practicing architect, New York City, and consulting architect for the Federal Government, spoke on planning for low cost housing, stating that is is the desire to provide better construction and equipment at lower cost. The saving should not be made by resorting to cheap or shoddy materials and equipment, stated Mr. Wright, but by simplification and substitution of equally satisfactory materials and equipment where available at lower cost. In his opinion plans should include provisions for gas stoves and mechanical refrigerators. He pointed out that although the matter of heating systems would be covered in detail later in the conference, in his opinion, gas fuel was to be preferred where local rates were such as to bring the cost within reasonable range of other fuels. In commenting further, Mr. Wright stated that whereas the Federal Government had provided for low interest rates, the National Recovery Act would result in higher maintenance costs. In view of the latter fact, it was felt that houses should be built well so as to last a long time. He pointed out that the initial investment in building and equipment could be more providing the maintenance costs were less. Therefore, it appears that the low maintenance cost of gas cooking, heating, and refrigeration equipment is another reason why gas should be preferred for these services.

R. L. Davison, director, Pierce Foundation, New York City, in the course of his discussion displayed plans that had been prepared by his organization for kitchen layouts. He stated that the first plans drawn up had involved the use of a standard Electrolux gas refrigerator, but that through the cooperation of the manufacturer, a 22-inch Electrolux had been built which worked in better with the unit, making it possible to provide for interchanging different pieces of kitchen equipment to suit individual tastes. In discussing the heating problem, Mr. Davison stated that where cost of gas is competitive, it is to be recommended, but that the type of fuel used in any instance would naturally depend on local conditions. The advisability of using a continuous or intermittent heating system, according to Mr. Davison, depended upon the type of wall construction employed. It was his opinion that for houses with walls of high heat capacity continuous heating was preferable, whereas with walls of low heat capacity which could be brought to equilibrium within a relatively short period, intermittent heating might be the most economical.

Mr. Davison expressed the opinion that air-conditioning equipment is too expensive to be considered at present but felt that year-around air conditioning might be practical within the next year or two for upper class low cost housing.

Probably the most interesting paper of the conference, insofar as the gas industry is concerned, was given on the subject of "Heating and Ventilation," by F. H. Valentine, of the firm of Mayer & Valentine, consulting engineers of Cleveland. Mr. Valentine's paper involved a study of heating systems in relation to large scale low cost housing. In his introduction to the subject he pointed out there were three elements of expense that must be considered in determining the type of heating system to be used, namely, (1) initial cost, including installation; (2) cost of operation; and (3) maintenance cost. The last two he considered as being more important than the first. In his opinion, whatever system was employed should be capable of withstanding a reasonable amount of abuse and mistreatment. Since leakage is a major item in the heating of buildings, the employment of insulating materials, water proofing, and weather stripping was considered as being highly important.

Three methods of heating multiple low cost housing units were discussed by Mr. Valentine, namely:

1. Steam from District Heating Company:
   a. Purchased on meter rate basis (Preferable).
   b. Flat rate basis (Wasteful).
2. Central Group Heating System:
   a. Steam.
      (1) One-Pipe System.
      (2) Two-Pipe System.
   b. Hot Water.
3. Individual Heating Plants for Each Apartment in the Building:
   a. Steam.
   b. Hot Water.
   c. Warm Air:
      (1) Gravity Warm Air Furnaces.
      (2) Forced Air Systems.
   d. Individual Room Heaters.

In discussing the fuels to be used Mr. Valentine pointed out that coal was not applicable for large scale heating except possibly for individual units because of the lack of storage space, ash disposal and because of the smoke and dirt involved. Oil was also considered to be out of the question

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Pacific Coast Gas Association

Managing Director: Clifford Johnstone
Association Headquarters:
447 Sutter Street, San Francisco

President: George P. Egleston
General Manager, H. R. Basford Co.,
San Francisco

Annual Organization Conference Spurs Committee Work

A LONG step was made toward the initiation of another year of successful endeavor on the part of Association committees at the annual Organization Conference held in San Francisco on November 23 and 24. The decisions made at the various section meetings are outlined by the Section Chairmen elsewhere on this page. The Public Relations and Technical Section meetings were particularly well attended and those who were fortunate enough to attend the Commercial Section meeting were well repaid by hearing a most valuable discussion of class rates by B. B. Beckett, rate engineer of the Pacific Gas and Electric Co. This paper is published in the current issue of *Western Gas*.

The Conference closed with a luncheon on Friday, November 24, at which the principal speakers were P. M. Downing, vice-president and general manager of the Pacific Gas and Electric Co., and State Senator Bert B. Snyder of Santa Cruz. Mr. Downing stressed the importance of load building and sales promotional plans in the future of utility companies, and touched briefly upon the need for clear and sympathetic thinking on the part of utility managements in times of depression and political unrest such as exist at present.

Senator Snyder, while speaking as a layman to the gas industry, expressed the conviction that the success of the utility company and the success of the community it serves are at all times fully inter-dependent and that his experience as a legislator led him to have no faith in public ownership because political exploitation and political spoils will on an average and in the long run exclude efficiency.

The closing feature of the luncheon program was the showing of the Southern California Gas Co.'s new sound picture "The Inside Story of Gas." In introducing the picture, A. B. Macbeth, president of the Southern California Gas Co., said that it had been made entirely by members of the organization as a part of the company's employee and consumer educational program and that it was booked months in advance for showing at club and lodge meetings. The picture is an exceptionally good one and gives a very clear conception of the entire field of a natural gas company's operations, following the gas from the field to the user and giving intimate glimpses behind the scenes with employees. The picture was shown by W. P. Dawe who also used his sound equipment to good advantage by playing college airs during the luncheon.

Ground to be covered in the work of the Association's five Sections is suggested in the following information from Section chairmen. Proceedings at the Organization Conference are also reported for the Sections.

Accounting Section

W. J. McCoy, *General Chairman*

THE Executive Committee of the Accounting Section met at San Francisco and arranged for a program for the current year. As much of the work done by the Section in previous years related to cost accounting, it was agreed that this phase would be eliminated entirely for the year 1934 and that the Section would confine its activities to topics of system and practical accounting routine. After a general discussion of a number of topics presented, the following were tentatively selected for study:

1. Practical safeguards to reduce loss through holdup and robbery of collection offices.

2. Coordination of paper work between purchasing, receiving and disbursing departments.

3. Accounting and financial statistics presented in an interesting and understandable manner by the use of charts and graphs.

4. Necessity for a periodic review of the system of internal control.

5. Practical suggestions for saving time and effort in making a physical inventory of material and supplies.

6. Beneficial information that can be gained by a study of inventory records.

7. The use of a combination trial balance and assembly sheet to reduce the detail work of preparing monthly balance sheets.

8. Advantages of direct posting to control ledgers over the method of posting from summaries.

9. Accounting problems arising from the change in the California laws relating to state taxes effective in 1935 (Stewart-Riley Bill).

10. California Sales Tax.

11. System for recording and control of guarantee deposits.

12. Annual reports to stockholders as required by Section 358 of the California Civil Code.

Due to the inability of many accounting executives of member companies to be in attendance at the meeting, it was not possible to assign to individuals the preparation of papers on the subjects, and it was left with the Chairman to arrange this matter by correspondence. An effort will be made by the Chairman to carry out this plan and obtain from capable qualified representatives of member companies, papers on at least four of the subjects listed above.

Commercial Section

Pierre Vinet, *General Chairman*

Pierre Vinet

COMMERCIAL Section activities will fall under two major sub-committees, the Industrial Committee headed by Frank H. Woodward, industrial engineer of the Pacific Gas and Electric Co. in Oakland, and the Domestic Committee headed by Frank L. Moon of the Los Angeles Gas and Electric Corp.

In addition, at the suggestion of the Technical Section a commitee of three or four men will be selected from the above mentioned committees to work with the Utilization Committee of the

Technical Section. Discussion at the San Francisco conference emphasized the necessity for a continual close contact between utilization and commercial departments of gas companies, as vital to proper installation and operation of gas appliances.

The Commercial Section's Industrial Committee plans to study all types of competition, particularly oil and electric. Agricultural load will be a subject for discussion, especially as regards use of natural gas engines. Liquefied gas will also receive some consideration.

Domestic Committee work will be sub-divided under the following heads with sub-committees for each division: Range; water heater; central house-heating; auxiliary space heating; laundry equipment; air-conditioning; refrigeration; architects and contractors manual.

Some thought is also to be given to the home economics department. Consideration will also be given to the meeting of competition, particularly from the electrical field, where the subjects of long terms or rentals, are now being considered.

Another subject which was discussed at length at the San Francisco meeting was the matter of rates, following a very capable paper presented to our meeting by B. B. Beckett, rate engineer for the Pacific Gas and Electric Co., regarding class rates for gas service.

Some work is contemplated on appliance servicing to develop specific recommendations for improvement in this field of customer service.

Chairman Vinet has launched a new procedure this year by soliciting the aid of former Commercial Section chairmen in preparing the year's work, and states that replies to his requests for suggestions have been very gratifying.

Publicity and Advertising Section

DOUGLAS BUCKLER, *Chairman*

REALIZING the profit derived from committee work done by members of the Publicity and Advertising Section in past years, plans were formulated in the recent organization conference for a departure into enlarged fields of investigation.

An activity never before undertaken by the Section will be an attempt to learn from the hundreds of gas appliance salesmen employed by Association member companies the exact points of sales resistance they meet in their daily house-to-house canvass. This information will be compiled and studied and from it, it is hoped, conclusions may be drawn decidedly helpful in the preparation of advertising.

Another activity never before attempted by the Section will be a systematic study of the advertising of eastern utilities. The best that is being done in the country will be analyzed and compared with Pacific Coast gas advertising.

Douglas Buckler

A study will be undertaken of means by which authentic and reliable news and information regarding the gas industry may be disseminated through the columns of publications so that the public will have a more accurate conception of the gas industry and the value of its service.

The members of the Section realize that increasingly heavy responsibility rests upon the advertising departments of the member companies, and Sectional activities during 1934 will be consistently devoted to a study of the means by which this responsibility may be worthily assumed.

Public Relations Section

R. E. FISHER, *Chairman*

FOR the purpose of developing ideas and securing benefit from the experience of others interested, the following subjects were presented at the Section's meeting in San Francisco:

1. Public Relations Audit.
2. Employees Conference Method of Training.
3. Standard Servicing Practices and Procedure.

R. E. Fisher

In connection with the Public Relations Audit a visual demonstration was staged under the direction of Don C. Ray, manager Bureau of Public Relations, Pacific Gas and Electric Co. This audit consists of a telephone follow-up on completed service orders to secure from the customer their reaction to the company's efforts to serve. Also the opportunity is taken to obtain suggestions for improving the entire service of the company.

It was explained by Mr. Ray that the objective of this survey was not to check up on employees, but rather to obtain direct from the customer information not otherwise obtainable, for the ultimate betterment of service.

The Conference Method of Training was explained by E. G. McCann, manager personnel department Pacific Gas and Electric Co. The organization program and results obtained were reported upon. Mr. McCann stressed the importance of free unhindered expression of ideas in the conduct of such a program.

Concerning a standard servicing policy and procedure, H. C. Ross, utilization engineer, Pacific Gas and Electric Co., explained the need for uniform utility servicing policies and covered in detail the benefits to be derived by the customer and the utility. It was determined that a joint committee be appointed to give this subject further study.

Technical Section

F. A. HOUGH, *General Chairman*

THE Technical Section's plans for the coming year, as developed by the major committee chairmen at the Organization Conference are given below. In most cases the sub-committees are just being organized, so it is not now possible to give the names of members.

PRODUCTION COMMITTEE

F. C. Hawks, Chairman
Washington Gas & Electric Co.

Appointment of sub-committee chairmen for this committee is not yet complete. Tentative plans now call for the organization of sub-committees on tar disposal, chemical laboratory methods, and high B.t.u. oil gas.

TRANSMISSION COMMITTEE

P. E. Beckman, Chairman
Pacific Gas and Electric Co.

Sub-committee on Pipe Protection: W. R. Schneider, Chairman, Pacific Gas and Electric Co. This committee will continue investigations that have been in progress for the past several years. These include:

(a) Correlation of soil survey data with rate of pitting.

(b) Seasonal variation in soil moisture content.

(c) Effect of soil moisture on soil corrosiveness.

(d) Effect of soil moisture on soil stress.

(e) Cathodic Protection. This phase of the committee's work will be emphasized this year. The economics of cathodic protection, the effect of cathodic protection on bituminous protective coatings, and field methods for making potential surveys, will be reported on. The application of cathodic protection to lines that pass through or near pipe networks may also be studied.

Sub-committee on Large Volume Gas Measurement: R. M. Stewart, Chairman, Pacific Gas and Electric Co. The work of this committee will be confined to continuation of the

study started last year of the critical flow method of testing large displacement meters.

Sub-committee on Dehydration of Natural Gas: A. B. Allyne, Chairman, Southern Counties Gas Co. This committee will report on the following investigations, all of which are now in progress:

(a) Dehydration by means of solid adsorbents.
(b) Dehydration by means of atmospheric cooling.
(c) Design of water separators for transmission lines.
(d) Application of wet and dry bulb thermometry to the measurement of the humidity of natural gas under high pressure.

Sub-committee on Compressor Stations: Arthur B. Newby, Chairman, Southern California Gas Co. This committee will continue the work started last year on the dissipation of heat from gas engine pistons.

DISTRIBUTION COMMITTEE

A. R. Bailey, Chairman
Coast Counties Gas & Electric Co.

Sub-committee on Procedure for Major Interruptions to Gas Service: Wm. Henderson, Chairman, Los Angeles Gas & Electric Corp. This committee will give special consideration to interruptions to service caused by earthquakes. It will study factors in the design and construction of distribution systems that will tend to minimize the damage done to such systems by earthquakes, and it will also study the procedure to follow at the time of an earthquake.

F. A. Hough

Sub-committee on the Effect of Humidity on the Performance of Domestic Meters: H. M. Crawford, Chairman, Los Angeles Gas & Electric Corp. A continuation of the work done last year on this subject. Laboratory tests will be conducted to determine the effect of humidity on leathers treated by different tanning processes and different types of dressing.

Sub-committee on Service Connections for Cast Iron Pipe: H. S. Harris, Chairman, Los Angeles Gas & Electric Corp. This committee will endeavor to develop suitable service connections for cast iron mains, either directly or by creating interest in this subject among members of the Association and the manufacturers of cast iron products. A study of service connections now available and now in use will be made, and tests will be conducted on new ideas submitted to the committee.

Sub-committee on the Maintenance of Curb Meter Installations: The organization of this committee, to study corrosion and other problems resulting from the use of curb meters, is under consideration. No chairman has yet been appointed.

Sub-committee on Distribution Pressure Control: Elting Henderson, Chairman, Southern California Gas Co. This committee will continue the study started last year. This year's work will be confined to a study of various methods for distribution pressure control and to the economics of distribution pressure control.

UTILIZATION COMMITTEE

Frank Wills, Chairman
Pacific Gas and Electric Co.

This committee is being organized this year in the Technical Section for the first time. It is planned to form several sub-committees to handle phases of the program. Titles and chairmen for these sub-committees have not yet been selected.

The type and scope of the work this committee will undertake can best be indicated by listing some of the subjects that are under consideration. It has not yet been decided which of these studies will be started this year.

1. *Corrosion of Water Heater Tanks:* Determine relation between local conditions, water characteristics and probable life of tanks. Correlate with data assembled by A. G. A. Water Heating Committee.

2. *Vents and Venting Materials:* A study of service characteristics observed and methods of installation used for various metallic and non-metallic venting materials. Determine how to provide adequately for condensation. Permissible maximum length of runs; when, where and extent of insulation of vents required.

3. *Appliance Regulators:* A determination of sound reasons for advocating or requiring individual appliance regulators or opposing their use. Balance extent of benefit likely to result in each type of appliance against increase in service difficulties likely to arise.

4. *Factors Affecting the Operation of Gas Burners:* A mathematical and experimental investigation.

5. *Domestic Appliance Servicing.*

6. *Low Demand Water Heaters:* Determine and correlate available statistics on hourly hot water demand per person per day for families, dwellings, hotels and apartments of various sizes. Determine best relative sizes of burner capacities and storage tanks for given hot water demands. Consult published data of American Gas Association, Edison Electric Institute, and other sources.

7. *Competitive Fuel Data.*

(a) *Reversed Refrigeration (Heat Pump):* This study should consist of a review of all data published on size, cost and efficiency of installations. Most of the reports on this subject appear in electrical journals, principally in Electrical World.

(b) *Domestic Oil Competition:* Consider new domestic oil-fired heaters (such as G. E.), water heaters and range conversions, cost and operating characteristics.

(c) *Domestic Electrical Operating Data:* Actual comparative costs, operating features and results of electric cooking, water heating and space heating, off-peak and direct. Include service costs, if obtainable.

8. *Factors Affecting the Operation and Design of Pilots for Automatic Gas Appliances.*

Plans are being worked out with Mr. Vinet, chairman of the Commercial Section, whereby members of both the Commercial and Technical Sections will be appointed to serve on those sub-committees which are working on problems in which the Commercial Section is interested.

Committee on Current Literature: A special committee was appointed at the Conference to devise, if practicable, some plan that will assist the members of the Technical Section to keep up to date concerning developments reported in the current technical magazines. This committee will also study ways and means to assist the committees to obtain from the literature all available information concerning any subject under investigation. The committee will report as soon as possible so that this year's organization may benefit as much as possible from any plan that is put into effect. The members are H. W. Geyer, chairman, W. R. Schneider, R. U. Fitting, C. P. de Jonge.

Cooperative Advertising During 1934

ON January 1 the Pacific Coast Gas Association will enter upon its fifth successful year of conducting a cooperative load building campaign for the gas industry through display advertising in Pacific Coast trade journals. As during the past two years, the advertising will be restricted to commercial and industrial subjects.

The industries to which the story of gas will be told will include the building industry through contractors, architects and plumbers, the hotel and restaurant industry, the machinery and metal industries, the baking industry, the dairy industry, the laundry and dry cleaning industry, the candy and ice cream industry, and the gas appliance retail trade. The committee will continue to lay a great deal of stress on the preparation of technical articles on gas utilization. Over 150 such articles from the expert typewriter of James Ferguson have appeared in print during the past 12 months.

The 1934 campaign will be in charge of a committee headed by A. C. Joy of the Pacific Gas and Electric Co., and includes Douglas Buckler, Southern California Gas Co.; J. Earl Jones, Seattle Gas Co.; D. L. Scott, Los Angeles Gas and Electric Corp.; and Pierre Vinet, Coast Counties Gas & Electric Co.

Addison B. Day Member of A. G. A. Executive Board

THE first meeting of the Executive Board of the American Gas Association for the new Association year, 1933-34, was held at A. G. A. headquarters in New York, November 15.

Addison B. Day

Addison B. Day, president and general manager of the Los Angeles Gas and Electric Corporation, Los Angeles, Calif., at this session was elected a member of the Board to fill the vacancy created by the elevation of Judge H. O. Caster, of Henry L. Doherty & Co., New York, to the presidency of the Association.

Mr. Day is a leader in Pacific Coast utility circles. He entered service of Los Angeles

Lighting Co. on February 1, 1895, and has been connected with that company and its successors and affiliates continuously ever since. From his first position of gas appliance salesman he moved in succession to bookkeeper, chief clerk, manager appliance department, auditor, assistant secretary, manager operation, general superintendent, vice-president and general manager, executive vice-president and general manager, and president and general manager, the last dating from April 1, 1928. He is a director of Industrial Fuel Supply Co., treasurer and director of Ventura Fuel Co., director of Southern Fuel Co., and was president of the Pacific Coast Gas Association in 1920.

GAS COMPANY OPERATIONS FOR THE STATES OF CALIFORNIA, ARIZONA, NEVADA, OREGON AND WASHINGTON AND THE PROVINCE OF BRITISH COLUMBIA

Nine Months Ending September 30, 1933 Compared with Similar Period in 1932

PACIFIC Coast gas company operations for the first nine months of 1933 compared with the corresponding period of 1932 are covered in a statistical statement from the Pacific Coast Gas Association, released November 11.

A comparison of this statement with those issued for the first quarter and the first half periods indicates that the gas business in the Coast states has hit the bottom and is now on the upturn. Plus signs are appearing here and there in the statement, and in all cases in which 1933 figures are still below 1932, the percentages are less than those at the 6-month period.

Consolidated figures for states in the Association area are given below:

	1932	1933	Per cent Change
Production—M c. f.			
Water Gas	2,171,703	1,702,822	
Coal Gas	1,129,755	521,075	
Oil Gas	5,722,163	3,310,758	
Coke Oven Gas	508,585	1,248,108	
Butane Gas—550 B.t.u.	192,044	169,829	
Natural Gas Purchased	96,420,742	107,685,314	
TOTAL	106,144,992	114,637,906	+8.0%
Active Meters—Sept. 30			
Domestic	1,518,951	1,513,111	—0.4%
Commercial and Industrial	69,126	70,763	+2.4%
TOTAL	1,588,077	1,583,874	—0.3%
Sales—M c. f.			
Domestic	46,706,376	46,246,409	—1.0%
Commercial and Industrial	35,756,293	41,020,578	+14.7%
Electric Generation	10,131,134	10,679,703	+5.4%
TOTAL	92,593,803	97,946,690	+5.8%
Gross Revenue			
Domestic	44,206,001	43,371,276	—1.9%
Commercial and Industrial	10,515,309	11,111,846	+5.7%
Electric Generation	1,309,539	1,240,988	—5.2%
TOTAL	56,030,849	55,724,110	—0.5%

W. M. Couzens Leaving A.G.A. Lab. To Join Grayson Appliances, Ltd.

W. M. Couzens, until recently supervisor of the Pacific Coast Branch of the A.G.A. Testing Laboratory, and for the past eight months one of the department heads at the Cleveland Laboratory, announced his resignation from the Laboratory, effective December 1. He is joining the staff of Grayson Appliances, Ltd., Lynwood, Calif., to become the eastern manager for that firm.

Mr. Couzens began his relationship with the A.G.A. Laboratory as a testing engineer in September, 1926, after graduating from Tri-State College that year. He later worked into the research department, and in 1928 was appointed chief inspector. In 1930 he was chosen to organize the first branch Laboratory in Los Angeles which has become a very active center for laboratory service on the west coast. Since last February, when he exchanged position with Dr. F. E. Vandaveer, he has been located at the Cleveland Laboratory, supervising all research investigations being conducted there.

Will Finish Arizona Line Early in January

NATURAL gas is expected to be flowing into Phoenix through the new mains of the Western Gas Co., not later than the first week of January and possibly before, according to C. P. Bedford, superintendent in charge of construction work for the Bechtel-Kaiser Co., which has the contract.

The right-of-way over which the pipe line will be laid has been cleared from Douglas to Tucson and is now being extended to Phoenix. More than 40 miles of line had been completed early in November, and by the middle of the month the line was finished to a point west of Tombstone, within 35 miles of Tucson. Pipe had been strung to within 10 miles of Tucson.

A 3-weeks gas study school opened on October 30 in Tucson, in charge of C. H. Weber, gas superintendent of the Tucson, Gas, Electric Light and Power Co. The school met three times a week and instruction was received in the application of natural gas for heating purposes, principles of gas consumption, house piping, appliance adjustments, estimating heat requirements and the fundamental points of selling gas-fired equipment. The short-course was open to all dealers, plumbers, and others interested in the sale and installation of natural gas equipment, at no cost. Instruction was given by Mr. Weber and C. C. Tucker, of El Paso, heating engineer of the Western Gas Co.

Needy Unemployed Families Aided By So. Cal. Gas Utilities

A plan of assistance for needy unemployed families has been developed by Los Angeles Gas and Electric Corp., Southern California Gas Co., and Southern Counties Gas Co., all headquartered in Los Angeles. An adequate supply of natural gas will be provided such families under federal supervision, the gas companies donating 75 per cent of the amount of gas bills incurred by members of those Unemployed Cooperative Relief Units which are registered with the Federal Relief Administrator as being 100 per cent cooperative. Cases will be individually recommended by the Federal Relief Administrator.

Monthly limits on the amount of gas to be donated are established, on the basis of family size—for example, during the month of December families of three persons or less will receive 3,000 cu. ft.; families of four or five persons, 3,500 cu. ft.; families of six or more persons 4,000 cu. ft.—the companies contributing 75 per cent of the amount of the gas bill.

K. B. Anderson Moves Headquarters to San Francisco, Calif.

K. B. Anderson, manager, Coast Industrial Gas Co., has moved his headquarters from Pittsburg, Calif., to San Francisco where he will act as assistant to the president of the Natural Gas Corp. of Oregon and the Natural Gas Corp. of Washington. Mr. Anderson will be active in the Pacific Public Service Co., parent company of these organizations, which also headquarters in San Francisco.

No Session This Year for Montana Group

Walter F. Brittan, secretary of Montana Chapter, Rocky Mountain Oil & Gas Association, states that no meeting of the organization will be held this year, due to the fact that representatives of member companies have been brought together so frequently in recent months in connection with petroleum code work.

Davenport Will Have Natural Gas By January 1, 1934

NATURAL gas will be available to consumers in Davenport, Iowa, about January 1, 1934, according to announcement by Harry E. Littig, general manager of the People's Light Co. A 14-year contract has been signed with the Natural Gas Pipeline Co. of America to supply gas from its Texas-Chicago line, and it is estimated than 900,000 cu. ft. will be delivered to Davenport daily. A 6-mile, 8-inch lateral to be laid by the People's Light Co. will bring gas from the main line to the western limits of Davenport. Republic Steel Corp. is furnishing this pipe.

A governing and metering station will be established at Blackhawk, Iowa, taking gas from the pipe line company at a minimum pressure of 225 pounds. Two and a half miles of new 8- and 6-inch cast iron pipe supplied by American Cast Iron Pipe Co. will be laid over the city to provide better pressure and service.

Mid-West Meter School Shows Good Attendance Gain

An attendance of 144 men from Mid-West Gas Association territory, including branch superintendents as well as gas meter and service men, was recorded at the 13th annual Mid-West Gas School and Conference, held at Iowa State College, November 13 to 16. This represented a 5 per cent increase over last year's attendance. The Conference is held annually, at Ames, Iowa, under joint auspices of the Mid-West Gas Association and the Engineering Extension Service of Iowa State College.

A timely program was available at this year's school, including discussions on such topics as change-over problems, humidifying gas, methods and results of oil fogging, substitute gas for emergency and peak loads, and various papers dealing with specialized meter topics. Much of the discussion by A. C. Rathkey, of the Iowa Public Service Co., on the subject of substitute gas is presented in this issue of *Western Gas*.

Voluntary Reduction Brings Low House Heating Rates in Portland

Portland Gas and Coke Co., Portland, Ore., has filed a new rate schedule with the Public Service Commissioner which brings voluntary reductions of about $100,000 a year to company consumers for heating, cooking and water heating. Customers using gas as principal house heating fuel will benefit most substantially. The new rates for general house-heating start at $1.50 a month plus 40 cents per M c.f. for the first 10 M c.f., 35 cents for the next 40 M c.f. and 25 cents for excess consumption. The new househeating schedule includes a provision for rate fluctuation with changing oil prices, with a restriction that gas rates shall not exceed former rates regardless of future oil prices.

Winchester Oil and Gas Co. to Serve Alva City Schools

The Winchester Oil and Gas Co. has recently established natural gas service to the city schools of Alva, Okla., as a result of the efforts of Lou Miller, manager for the company at Alva.

Gas Appliance and Apparatus Code Now Approved

PRESIDENT ROOSEVELT'S signature was affixed to the Code of Fair Competition and Trade Practices for the Gas Appliance and Apparatus Industry on November 27.

Through their representatives, members of the following organizations have prepared, submitted and approved the Code: Gas Appliances Institute; Gas Range Institute; Gas Space Heater Institute; Gas Water Heater Institute; Gas Boiler, Furnace and Conversion Burner Institute; Gas Apparatus and Accessories Institute; Association of Tank Water Heater Manufacturers.

The code becomes effective on December 7.

Sales prices and terms, and trade practices under the code were covered in *Western Gas* last month, and a few modifications in those sections of the tentative code which were quoted in last month's comment are noted in the final form.

The agency set up for administering, supervising, and promoting the performance of the code is the "Gas Appliances Committee." Membership on the committee as now comprised is made up of the following:

GAS APPLIANCES COMMITTEE

Chairman: John A. Fry, Detroit-Michigan Stove Co.

Representatives of Gas Range Institute: Mabon P. Roper, Geo. D. Roper Corp.; F. J. Hoenigmann, Cribben & Sexton Co.

Representatives of Gas Water Heater Institute: W. T. Rasch, American Gas Products Corp.; Arthur Friedman, Cleveland Heater Co.

Representatives of Gas Space Heater Institute: Carl E. Froelich, Continental Stove Corp.; E. C. Adams, Adams Bros. Manufacturing Co.

Representatives of Gas Boiler, Furnace and Conversion Burner Institute: Frank H. Adams, Surface Combustion Corp.; E. L. Payne, Payne Furnace & Supply Co.

Representatives of Gas Apparatus and Accessories Institute: Donald McDonald, American Meter Co.; H. A. Wilson, The Wilcolator Co.

Representative of Members at Large—Gas Appliances Institute: F. E. Sellman, Electrolux Refrigerator Sales, Inc.

The Administrator may appoint not to exceed three members, without vote, to serve with the Gas Appliances Committee in its administration of the Code.

Membership on the Committee is required to include the members of the Governing Committee of the Gas Appliances Institute, and this Governing Committee in turn is made up of representatives of the several member institutes represented in the Gas Appliances Institute, plus a representative for members at large.

H. O. King is deputy administrator for the code.

Charles K. Foster, vice-president of American Radiator-Standard Sanitary Manufacturing Co., New York City, is industrial advisor to the administrator.

C. W. Berghorn is secretary-treasurer of the Institutes.

Frazer & Torbet, Chicago, are consultants for the Gas Appliances Institute, which has headquarters at 3900 Board of Trade Building, Chicago, Ill.

7 Per Cent Gain in Volume of Gas Sold During September

SALES of manufactured and natural gas aggregated 86,416,800,000 cubic feet in September, an increase of nearly 7 per cent over the corresponding month of the preceding year, according to tabulations of the American Gas Association. Revenues were still slightly under last year, income for September amounting to $48,800,000 as compared with $49,874,100 in September a year ago, a decline of 2.2 per cent.

Most of the sales expansion of the industry was the result of pronounced increases in gas sales for industrial-commercial purposes, which averaged 14 per cent above the figures for September a year ago. Revenues from this class of business also gained, although not in proportion to increased volume, amounting to $14,532,900 in September as compared with $13,706,200 for the same month of the preceding year, an increase of 6 per cent.

While sales of manufactured gas for domestic cooking, water heating, refrigeration, etc., continued to run about 6 per cent below a year ago, sales for house heating purposes registered a sharp gain, amounting to more than 22 per cent over the preceding year. Manufactured gas sales for industrial-commercial uses were also above those of a year ago by nearly 12 per cent.

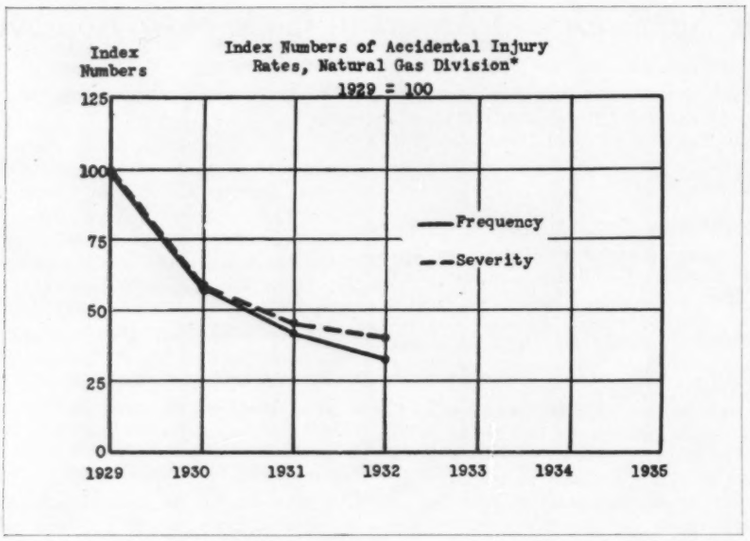
Natural gas sales for domestic uses during September about equalled those of a year ago, while sales to ordinary industrial customers were up 12 per cent. Sales to large scale industrial users of natural gas showed a gain of nearly 25 per cent over the same month of the preceding year.

Okla. Utilities Association to Convene March 6 and 7

Edw. F. McKay, manager of the Oklahoma Utilities Association, announces that the executive committee has selected March 6 and 7, 1934, as the dates for the 16th Annual Convention of the Association. The convention headquarters will be at the Mayo Hotel, Tulsa, Okla. The annual meeting will embrace all branches of the public utility industry in Oklahoma, and an attendance exceeding 500 is expected.

Nacona Gas System Changes Ownership

P. F. Lesh has been named president of The City Gas Co., recently organized to take over operations of the gas system in Nacona, Texas. The system was formerly owned and operated by the Texas-Louisiana Power Co.



Decrease in Accident Frequency and Severity

THE National Safety Council Inc., 20 North Wacker Drive, Chicago, Ill., has brought from the press a 32-page booklet on accidental injury statistics in the public utilities industries for 1932.

The tabulations show that since 1929, disabling injuries in natural gas operations have decreased 67 per cent in frequency and 41 per cent in severity. The reduction in frequency from 1931 to 1932 amounted to 21 per cent and the decrease in severity was 11 per cent.

The Honor Roll for 1932 shows Standard Oil Company of New Jersey as having the lowest frequency rate among large units—1.25. Oklahoma Natural Gas Corp., Tulsa, Okla., shows the largest reduction in frequency since 1930 among the larger units—66 per cent, also in severity—93 per cent. Oklahoma Power & Water Co's. Natural Gas Division is the largest small unit to attain perfect records in 1931 and 1932 thereby reducing both injury rates 100 per cent since 1930.

According to the study, most of the improvement in frequency in recent years is due to the elimination of temporary disabilities; but fatalities were also reduced in 1930 and 1931. For 1932 no change occurred in the frequency of fatalities, but permanent partial disabilities dropped sharply in both frequency and severity. This, in connection with the improvement in the severity of temporary disabilities, brought about the lower total severity.

The entire natural gas division averaged 13.11 in frequency and 1.62 in severity for 1932. These rates are based on records from 107 companies whose employees worked over 66,000,000 man-hours. Frequency is above the average of 9.82 for all public utilities and is higher than for any other important division. Severity, on the other hand, is below the general average of 1.83, and is less than the rates for electric, gas and electric, and manufactured gas companies.

Rates for all natural gas companies would be considerably higher were it not for the good records made by large units. These offset comparatively high frequency rates among middle-sized units, and high severity rates among small units.

Gas Refrigeration Sales Area Expands in Texas-Louisiana

RIGHTS to merchandise Electrolux gas refrigerators in 137 of the smaller cities, towns and villages throughout Texas and Louisiana have been granted to four Texas gas companies which are subsidiaries of the Electric Bond & Share Co., according to announcement of F. E. Sellman, vice-president of Servel, Inc. The Electric Bond & Share Co., subsidiaries in question are: United Gas Public Service Co., Southern Gas Utilities Co., Northern Texas Utilities Co., and the Southern Gas Co.

Under its contract with Servel, Inc., the United Gas Public Service Co., with headquarters at Houston, Texas, will sell Electrolux refrigerators in 88 localities in all sections of Texas, and in 31 small centers in Louisiana, making 119 places in all.

Southern Gas Utilities Co., with headquarters at Houston, Texas, will merchandise Electrolux in seven Texas towns, and the Northern Texas Utilities Co., also with headquarters at Houston, has obtained Electrolux sales rights for 11 centers in the same state.

Southern Gas Co., with headquarters at Mathis, Texas, will merchandise Electrolux in Mathis.

Wellsville, Kan. to Vote on City Distributing System

Citizens of Wellsville, Kansas, on December 12 will vote on issuing $20,000 in bonds to construct a natural gas distributing system for the city. Gas will come from wells within a mile or two of the town.

"Housewife's Friend" Doing Good Job for Portland Gas & Coke

PORTLAND Gas & Coke Co's new customer magazine "The Housewife's Friend" recently announced in these columns, is fast developing into something unique, as house organs go. Published in 6x8½-inch format, it has now grown from four to eight pages and the November issue finds something interesting to say about 28 different subjects, all with an application to the home field.

John H. Hartog, manager of the company's new business department, is editor of "The Housewife's Friend," and many others of the company's staff are represented among contributors. Photographs help to give the monthly booklet an unusual appeal, some of them being specially posed.

Those in the November issue show an audience at a recent Portland cooking school, an attractive girl exhibiting the company's Gasco Briquettes, a small cartoon dealing with the tax burden, and two views of homemakers at routine tasks.

In preparing editorial material for this consumer magazine care is taken to avoid self-praise or propaganda for the gas company. It is found that the many-sided operations of the company offer a great number of customer contacts which merit attention.

"The Housewife's Friend" is found to be a fine medium for conducting prize contests, and a contest is now being run for children of the company's patrons.

Frank C. Smith Now Heading Houston Natural Gas Co.

At a meeting of the board of directors of the Houston Natural Gas Co., Houston, Texas, November 13, Frank C. Smith was elected to succeed W. B. Trammell as president of the company. Tucker Blaine was elected at the same meeting to succeed D. P. Perkins as secretary. Mr. Blaine is a director and general insurance agent. It is expected that Mr. Smith, also director and vice-president of the Houston Land and Trust Co. when elected to the office of president of Houston Natural, will resign this position to devote his entire time to activities of the utility. J. H. Wimberly, assistant secretary and auditor for Houston Natural Gas Co., and Eugene George, vice-president, will continue in their respective capacities.

A.G.A. Assembling Degree Day Data for Various Cities

The American Gas Association, through the cooperation of M. J. Grandbois of the General Gas Light Co., has begun work on the collection of charts giving the degree days per season for average outside temperatures from 40 to 65 degrees for various cities. Data have already been prepared for 200 cities in the United States and will permit a more accurate evaluation of the gas consumption for unit heaters than would otherwise be possible.

Las Cruces Wants Gas Plant

The city of Las Cruces, New Mex., on November 6 instructed City Attorney E. G. Shannon to make formal application for R. F. C. funds to finance a municipal gas plant.

COMMITTEE:
DOUGLAS BUCKLER...SO. CALIF. GAS CO.
J. EARL JONES.....SEATTLE GAS CO.
A. C. JOY (CHAIRMAN).....P. G. & E.
PIERRE VINET.....C. C. G. & E. CO.
D. L. SCOTT.....L. A. G. & E. CO.

HEADQUARTERS:
PACIFIC COAST GAS ASSOCIATION
447 SUTTER STREET, SAN FRANCISCO

GEO. P. EGLESTON, PRESIDENT
CLIFFORD JOHNSTONE, MNG. DIRECTOR

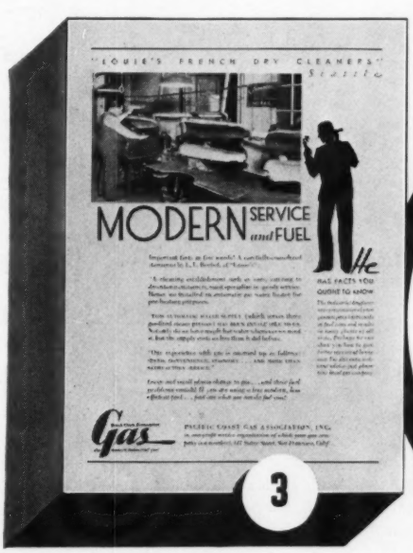
P.C.G.A. NEWS

CO-OPERATIVE ADVERTISING

1933 AD CAMPAIGN NEARING COMPLETION

THE GAS INDUSTRY'S FIFTH CONSECUTIVE COASTWIDE COOPERATIVE CAMPAIGN WILL BE CONCLUDED WITH DECEMBER INSERTIONS. 300,000 READERS OF 19 LEADING TRADE JOURNALS HAVE BEEN REMINDED, GRAPHICALLY AND CONSTANTLY, THAT *GAS* IS THE IDEAL INDUSTRIAL FUEL—*"QUICK, CLEAN, ECONOMICAL" FOR EVERY HEAT REQUIREMENT.*

DECEMBER SCHEDULE: *Miscellaneous Industries*—Western Baker . . . Western Confectioner & Ice Cream News . . . Pacific Dairy Review . . . Pacific Factory . . . Pacific Laundry Journal & Dry Cleaner . . . Western Machinery & Steel. *Architects & Builders*—Architect & Engineer . . . California Arts & Architecture . . . Pacific Builder & Engineer . . . Southwest Builder & Contractor. *Hotels, Restaurants* — Keeler's Hotel Weekly . . . Pacific Coast Hotel Record . . . Western Restaurant (these have been alternated with other similar magazines). *Retail Dealers*—Western Appliance Retailing. *Plumbing & Heating Contractors* — Western Plumbing & Heating Journal.



1 *Gas meets every test in 27 laundries of Southern Service Company, Ltd.*

2 *"Exceptionally fine results with gas." says Lucerne Cream and Butter Co.*

3 *A Seattle dry cleaner tells how modern gas appliances make and save money.*

4 *"Contented tenants" in this apartment house—completely gas equipped.*

OUR NEWS SERVICE GETS BIG RESULTS

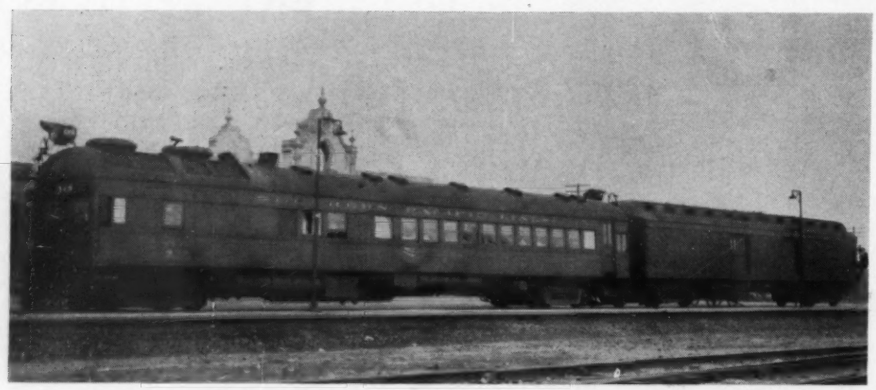
BY FURNISHING TRADE JOURNAL EDITORS THROUGHOUT THE WEST WITH ACCURATE, INTERESTING ARTICLES, OUR TECHNICAL NEWS SERVICE RENDERS INVALUABLE SERVICE. ELEVEN ARTICLES DURING OCTOBER, BRING THE 10 MONTHS TOTAL TO 113.

OCTOBER RESULTS: *Pacific Northwest Caterer & Steward* . . . "The Pheasant Uses Gas" . . . Tacoma's largest combination restaurant and confectionery. *Pacific Factory* . . . "Natural Gas Adopted in Los Angeles Enameling Plant." *Pacific Laundry Journal* . . . "Draft Control Effects Fuel Saving." *Pacific Baker* . . . "Efficient Use of Ovens Will Effect Great Saving in Fuel Cost." *Western Restaurant* . . . "Armstrong-Schroder Builds on Quality Ideas" . . . Beverly Hills Cafe. *Pacific Dairy Review* . . . "Control of Gas-fired Steam Boilers." *Pacific Brewer & Vintner* . . . "Gas Becomes Standard Fuel in Northern California Plants." *Western Confectioner* . . . "Good Humor Plant Comparable With Product" . . . Good Humor Ice Cream Co., Los Angeles. *Western Machinery & Steel* . . . (1) "Gas-fired Brass Furnaces and Core Ovens" . . . (2) "Industrial Heating and Drying by Gas." *Western Baker* . . . "Sugar Crest Doughnuts Win Portland Public."

Assuming that this rate is maintained in November and December issues, the year's results will total nearly 150 technical articles actually published, all citing efficient use of gas.

BUTANE • PROPANE NEWS

Vol. 3, No. 12 December, 1933



AT LEFT:

Southern Pacific Co.'s "8 Spot" gas-electric rail motor car now using butane. A duplicate of the "8 Spot," rail car No. 7, is now in the Los Angeles roundhouse for conversion to butane, and will be on the rails early in December; conversion of other cars is contemplated.

Butane Successful as Fuel for Rail Motor Cars

MUCH interest has centered about the use of butane as locomotive fuel on the Pacific Coast in recent months. T. H. Kruttschnitt, president of Butane Sales Co., San Francisco, Calif., who has been instrumental in pioneering this new application, presents the Southern Pacific Co.'s experience in the following discussion. Mr. Kruttschnitt's discussion is taken from an address to the Pacific Railway Club's annual meeting at Sacramento, Calif., in October.—*Editor.*

By T. H. KRUTTSCHNITT

President, Butane Sales Company, San Francisco, California

ABOUT five years ago some efforts were made on the Pacific Coast in the use of butane as automotive fuel, but those experiments were never carried to the point of efficient operation. The efficient use of butane in internal combustion engines depends entirely upon a mixing valve that will automatically ratio the gas and air to meet the engine's requirements, at all speeds and under all loads. These requirements are met in equipment now available, as a result of comparatively recent development work.

About a year ago the Southern Pacific Co. became interested in this fuel for its rail motor cars and as an experiment applied butane fuel to one of its McKeen cars. This car is propelled by a 10x12-inch six-cylinder engine, mounted on a front truck, and is rated at 200 horsepower. This test convinced the railroad officials that butane fuel had the following advantages over any other liquid fuel:

(a) A substantial increase in horsepower.
(b) Elimination of crank case dilution.
(c) Elimination of smoke, odor and obnoxious fumes.
(d) Smoother engine operation.
(e) A probable reduction in engine maintenance.

Based upon the foregoing, the railroad company converted one of its gas-electric cars, which on March 25 of this year made its first run between Los Angeles and Santa Barbara. This was a Brill-Hall-Scott car rated at 600 horsepower, but which developed a maximum of 580 horsepower on distillate.

The fuel supply is carried under the car in six pintsch gas reservoirs, retired from the gas-burning equipment, and a seventh tank with a capacity of one-tenth of the fuel supply is added as an expansion tank. The fuel is drawn from the bottom of each tank, through a 1-inch pipe, passing through the top of the tank, and through a shut-off valve into a 2-inch header equipped at one end with a hose connection for filling. The fuel supply is carried from the header, through a meter, to an emergency starting tank installed to gravitate fuel to the engines in cases where the air pressure is insufficient to do so. Compressed air, after passing through a dryer, is admitted into the top of the fuel expansion tank and from the top of this same tank through an air pipe into each fuel tank. Each air line is equipped with a glass bull's eye, and shut-off valve at the expansion tank to enable each tank to be filled separately, and until the fuel shows in the bull's eye.

From the top of the emergency tank, the liquid fuel is carried separately to each engine, through a heat exchanger where it is vaporized, thence through pressure-regulating and mixing valves into the intake manifold.

This car formerly consumed 1½ gallons of distillate and gasoline fuels combined per mile, and the lubricating oil was renewed every 800 miles, whereas, on butane the fuel consumption is 1 gallon per mile. About three months ago the railroad equipped these engines with new pistons to raise the compression ratio from 4 to 1, to 6 to 1, and the improvement obtained therefrom has more than justified its cost. The horsepower now available is 770, although 823 has been actually developed. The mean effective pressure is 114 lbs. per square inch, the firing pressure 758 lbs. per square inch, water temperature 150 to 160 degrees F., and miles per oil change 15,000. Oil consumed is 1 gallon per engine per 16,000 miles, although prior to a recent change of piston rings a record of 1½ gallons per engine per 14,000 miles had been obtained. Overall efficiency crank shaft to rail is 88 per cent. During a recent speed test this car handled two steel coaches weighing 120,000 pounds each, between Sacramento and Oakland (about 90 miles), in 1 hour and 35 minutes. The present fuel efficiency is .42 of a lb. of butane per horsepower hour, compared to .55 of a lb. of distillate per horsepower hour. Due to the higher firing pressure now being obtained the engines have to be equipped with ring seats. The cost of converting one of these cars is between $2,000 and $2300.

In connection with the use of butane as rail motor car fuel, consideration should be given to the evaporation of the fuel, insofar as it might be used for air conditioning. A car, such as the one referred to, evaporates sufficient liquid to reduce the temperature of 24,000 cu. ft. of air per hour 40 degrees, which is equivalent to four complete changes of air in the car containing 6,000 cu. ft. of air, or the air in a 6,000-foot car may be changed 10 times per hour and reduced 16 degrees below the outside atmospheric temperature.

In closing it seems reasonable to state butane fuel is an ideal one for rail motor cars and in many characteristics surpasses any fuel now being supplied for that purpose.

Philgas Issues Sales Helps to Men on Firing Line

A SERIES of weekly sales letters for its numerous selling agents has been introduced by Philgas Co., Detroit, Mich. Included among those receiving the letter are the company's own sales managers and service representatives, dealers, dealers' salesmen and the company's wholesale tank-car or cylinder-filling customers. Practical selling slants are informally presented in the letters, which should be enthusiasm-builders among Philgas salesmen.

Philgas has also begun publication of a monthly mimeographed bulletin entitled "Talking Things Over." This circulates to wholesale customers who distribute bottled gas, and editorial contents of the bulletin give specific information of help in this field. For example, Vol. 1, No. 1, carries a feature article on the subject of "Why Is Underwriters' Listing Important?" Another article lists many special applications for bottled gas. Ways and means to increase bottled gas sales, a question and answer department, operating "wrinkles," news items, etc., lend unusual interest to this house organ.

Liability Under Railroad Sidetrack Agreements

Contractual liability under railroad sidetrack agreements is dealt with in the November 8 insurance bulletin of the Compressed Gas Manufacturers Association, New York, N. Y. The bulletin gives information on responsibilities incurred by manufacturers who have railroad sidings at their plants, under agreements entered into with railroad companies. Necessity for extending public liability insurance to cover contractual liability under these sidetrack agreements is pointed out. Revision of old agreements and adoption of a more equitable standard clause developed by the National Industrial Traffic League is urged upon those having railroad siding agreements, since the old type of clause places practically the entire responsibility upon the manufacturer.

Research on Monochlor Derivatives of Liquefied Petroleum Gases

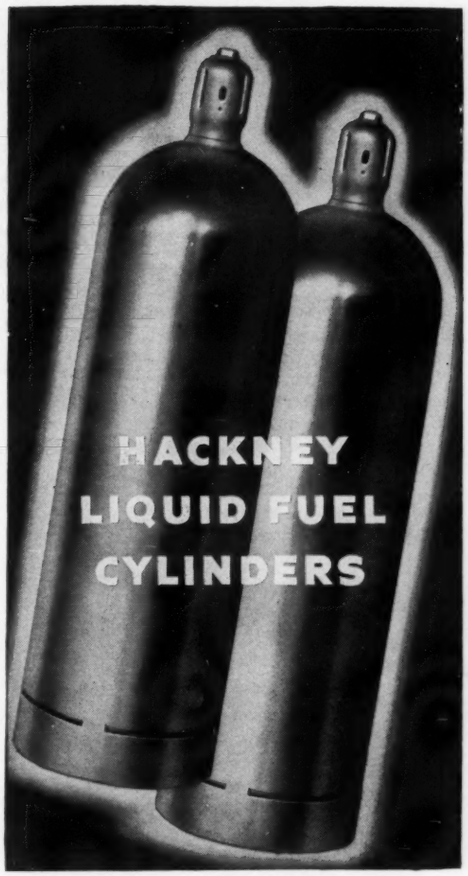
Dr. J. B. Garner, director of the natural gas fellowship for Mellon's Institute, and M. D. Crane, have been engaged since the first of July on special research in the liquefied petroleum gas field. Methods of procedure in chlorination have been developed, resulting in maximum yields of the monochlor derivatives of propane, normal butane and isobutane. It is intended to use these derivatives in the production of the corresponding alcohols, esters, ethers, and aromatic hydrocarbons, according to Dr. Garner.

Plant at Medford, Wis. Built by Wis. Bottle Gas Co.

The Wisconsin Bottle Gas Co., Oostburg, Wis., of which J. J. Verhelst is president, in November began construction of a propane bottling plant at Medford, Wis. Bottled gas will be distributed in a 40-mile area around Medford, the fuel being shipped to the bottling plant in tank-car lots. A similar plant may be erected at Tomahawk, Wis., next summer if present plans carry through. The company plans to extend its service through northern and north central Wisconsin. W. G. Van Driest is merchandising manager, B. W. Dirkse is in charge of the service department, and P. M. Daane is plant superintendent.

R.F.C. Loan Desired for Butane System at Wauchula, Fla.

The city of Wauchula, Fla. has applied for R. F. C. funds to finance the installation of a municipal butane gas system. Brokaw, Dixon, Garner and McKee, New York City, have been appointed engineers for the project.



ACCEPTANCE

There are TWICE as many HACKNEY liquefied Petroleum Gas Cylinders in service as all others COMBINED

Acceptance by the leading cylinder users of the country, for both liquefied petroleum gas and other gases, indicates the excellence of design and unvarying high quality of Hackney cylinders.

In the liquefied petroleum gas field alone, there are TWO Hackney cylinders in service to every ONE of all others combined.

Hackney users include: Phillips, Skelly, Shell, Standard, and other important companies. Users of cylinders for other gases include: Mathieson, Virginia Smelting, R. & H. Chemical, Air Reduction Sales, etc.

All users are invited to consult with Hackney—headquarters for cylinders.

PRESSED STEEL TANK COMPANY

1363 Vanderbilt Concourse Bldg., New York, N. Y. 666 Roosevelt Bldg., Los Angeles, Calif.
208 S. La Salle St. Bldg., Room 1185, Chicago, Ill. 6633 Greenfield Avenue, Milwaukee, Wis.

Hackney
MILWAUKEE

CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

Imperial Gas Co. Adds New 8-Ton Truck to Facilities

Imperial Gas Co., Los Angeles, Calif., has added to its facilities an 8-ton truck to haul butane-propane cylinders to agents in northern California. The truck loads out of Kettleman Hills fields. King Beardsley is in charge of northern California sales for the Imperial Gas Co.

American Liquid Gas Moves Offices

American Liquid Gas Co. moved its offices on November 1 to 1225 South Olive Street, Los Angeles, where enlarged space with storage and garage facilities is available. The company was formerly in the Transamerica Building.

BUTANE

Fuel of the Future

BUTANE is an efficient, economical substitute for manufactured gas, natural gas, and electricity for domestic and industrial uses, including heat-treating, cutting, welding, refrigerating. The perfect fuel for rail motor cars, busses, trucks, stationary engines.

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KEROTEST

Liquefied Gas Industry Code in Force

A "CODE of Fair Competition for the Liquefied Gas Industry" is now in effect, having been approved by President Roosevelt on November 8. It is strictly a marketing instrument, production being covered in the petroleum code, which code exempts marketing. To quote from Article 1, "This Code covers only the *marketing* of liquefied gas for any use whatsoever in any quantities and in any size or type of container whatsoever."

Labor provisions under the code limit maximum hours to 40 per week for all employees except outside salesmen and the executive staff who receive more than $35 per week. Employees are permitted to work 346 hours in any two-month period, but in no event more than 48 hours in any one week. Minimum wage rate for all employees excepting those working on a commission drawing account basis is 40 cents per hour.

An Emergency National Committee is established as the Code Authority, made up of 11 members elected by the industry with additional representatives (not exceeding three) to be appointed by the President. The Emergency National Committee is to select from its membership an Emergency Executive Committee composed of the chairman of the Emergency National Committee and three others, one of whom shall be a representative of the NRA.

Definitions

Definitions of "liquefied gas" and the term "marketer" under the Code are as follows:

"Liquefied gas for the purpose of this code is (a) an inflammable liquefied hydrocarbon material having a vapor pressure exceeding twenty-five pounds per square inch gauge at 70 degrees F. and/or (b) any inflammable liquefied hydrocarbon material with a lesser vapor pressure, but not less than nine (9) pounds absolute vapor pressure at 70 degrees F., when same is used as or in a similar manner to 'bottled gas' for purposes such as cooking, water heating, and the like by the gas feed, liquid feed, or other utilization system, or as raw material in 'pentane-air' machines and the like."

"A 'marketer' is any distributor, jobber, wholesaler, or retailer selling, reselling, or delivering to consumers liquefied gas in either barges, tank cars, tank trucks, or portable containers."

Readers of *Butane-Propane News* will be particularly interested in portions of Article 4, which article states the marketing rules for the industry:

ARTICLE IV—MARKETING

"Rule 1.—No 'marketer' engaged in the sale of liquefied gas products shall willfully induce, attempt to induce, or assist a party to break a then existing written contract for the sale of liquefied gas products or a then existing lease of the equipment used for the sale or utilization of liquefied gas products between that party and another.

"No 'marketer' engaged in the sale of liquefied gas products shall knowingly enter into any agreement to sell or deliver any liquefied gas to anyone where sale or delivery will violate or prevent the performance of a then existing written contract between the person to whom the sale or delivery is made and another.

"Nothing herein shall be construed to restrict another marketer from explaining the convenience and general features and operation of such marketer's utilization equipment to the customer of another marketer.

"No contracts in violation of this Code are protected under this rule.

"Rule 2.—When any equipment, tank, cylinder, or other device for the storage, consumption, handling, or sale of liquefied gas leased prior or after the adoption of this Code bears the name, mark, trade mark, or trade name of any 'marketer' engaged in the manufacture or sale of any such commodity, no other 'marketer,' unless that 'marketer' has been regularly serving such equipment immediately prior to the adoption of this Code, or unless such equipment is owned by Federal, State, or municipal governments or subdivisions thereof and no liquefied gas contract is in effect, shall deliver into or deliver for sale to such equipment, tank, cylinder, or other device or any tank or container connected therewith, any liquefied gas, other than that manufactured, sold, and distributed by the 'marketer' whose name, mark, trade mark, or trade name is so affixed, and no 'marketer' shall in any way knowingly be a party to the substitution of the one brand or type of liquefied gas for another, or the removal or transportation of any equipment, tanks, cylinders, devices, of the like belonging to another 'marketer.'

"No 'marketer' shall make any changes in, additions to, or substitutions from, any equipment installed on lease by any other 'marketer,' except where such 'marketer' has been regularly supplying liquefied gas for use in such equipment immediately prior to the adoption of this Code, or upon written permission of the owner thereof or the original 'marketer' installing same. Marks, trade marks, or trade names of any 'marketer' engaged in the manufacturing or sale of any such commodity shall not be removed by any other 'marketer' except on written authorization by such 'marketer' and/or owner.

"Rule 3.—As the bottled gas branch of the liquefied gas industry is a growing industry, and as it is still in its development period of creating new markets, marketing of appliances to consumers directly by the 'marketer' is essential, and all 'marketers' may sell appliances direct. Incentives such as load building appliances, utensils, advertising novelties, etc., shall be construed as assisting in building the industry and shall be allowed, but only to consumers already using liquefied gas as compensation for services rendered, and the value of such incentives shall not be disproportionate to business gained thereby.

"However, 'marketers' engaged in the sale of liquefied gas shall not give away any liquefied gas nor make any installation or lease free of charge or at less than posted prices.

"This rule shall not prevent (a) the giving of other reasonable prizes at fairs, public demonstrations, and cooking schools; (b) the giving of other reasonable incentive, to induce attendance at such public demonstrations or to obtain names of prospective consumers.

"Rule 4.—All 'marketers' shall post at each point from which they make deliveries, and at places readily accessible to the public, all prices for which liquefied gases are sold at

retail. All 'marketers' engaged in the retail sale or leasing of bottled gas equipment shall post at each point from which they make deliveries and at places readily accessible to the public, all retail prices for which bottled gas equipment are sold and/or leased. Upon adoption of this Code all 'marketers' shall submit posted price schedules and any price changes made thereafter in written form to the National Bottled Gas Association, or other association designated by the Emergency National Committee, within 24 hours after such change. Any person shall have access to this information from the 'Association' upon written request. All prices shall remain in effect for at least 24 hours after they are posted. Posting shall include the following: (a) The retail prices for all classes, types, methods, and quantities of deliveries of liquefied gas, (b) The prices and/or lease or installation charges for all types and specifications of liquefied-gas equipment for retail use; (c) a schedule of all discounts offered and the terms thereof and (d) a statement of all terms as to freight rates, deliveries and points of price basis. All retail sale or leased installations shall be made at the posted price or lease charges and no 'marketer' shall make any deviation from his posted price by means of rebates, allowances, concessions, benefits, script books, quantity discounts, discounts to buyers of a class or by any plan, device, or scheme, whereby any buyer obtains any liquefied gas or equipment, or lease, or installation at a net cost lower than the posted price.

"*Rule 5.*—No 'marketer' engaged directly or indirectly in the liquefied gas industry shall sell any liquefied gas below his prime cost; nor shall sell at retail any bottled gas equipment or appliances for less than his prime cost. Prime cost as used herein is understood to mean invoice figure plus transportation charges from source to storage."

Article 4 goes on to deal in some detail with utilization equipment. To summarize some of the main provisions:

All utilization equipment requiring portable and/or movable containers shall be approved by Underwriters' Laboratories, Inc., of National Board of Fire Underwriters and /or affiliates, and shall be installed, maintained and operated to conform with Underwriters' Laboratories rules.

Cylinders or drums purchased after the effective date of the code shall be built and maintained to I.C.C. specifications and regulations. Provisions for eventually retiring from service those cylinders or drums now in use which do not conform to I.C.C. rulings are also contained in this section, along with regulations for safe housing of storage containers.

Reconditioning of used equipment, so as to be equivalent from a safety standpoint to new equipment of the same type and specification, is required, and sale of used equipment below posted prices of unused equipment is prohibited.

It is also required that all consuming appliances not manufactured for liquefied gas shall be properly adapted or converted for its safe and efficient use, and no "marketer" shall render such conversion service at prices below cost of labor and material.

Marketing provisions of the code apply to all "marketers" of liquefied gas regardless of any of their trade associations or other industrial affiliations.

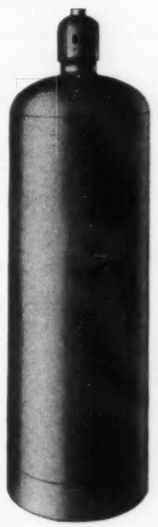
The code was prepared under auspices of the National Bottled Gas Association, of which Mark Anton is president and F. R. Fetherston is secretary. Mr. Fetherston served as secretary of the committee of 11 which prepared the original draft last August.

On this committee were the following: Mark Anton, Suburban Gas Co., Verona, N. J., chairman; Edward Braen, Protane Bottled Gas Co., Hawthorne, N. J.; J. J. Callahan, Hi-Heat Gas Co., New York, N.Y.; Morse G. Dial, Carbide and Carbon Chemical Co., New York, N. Y.; Milburn Hobson, Skelgas Company, Kansas City, Mo.; A. N. Kerr, Imperial Gas Co., Los Angeles, Calif.; W. G. Oliver, Standard Oil Co. of California, San Francisco, Calif.; P. E. Pope, Fuelite Natural Gas Co., Waltham, Mass.; L. H. Spiner, Shell Petroleum Corp., St. Louis, Mo.; R. W. Thomas, Philgas Co., Detroit, Mich.; W. F. Vercamp, Vercamp Corp., Cincinnati, Ohio.

G. G. Oberfell, president of Philgas Co. and vice-president of Phillips Petroleum Co., has been named industrial advisor for the liquefied gas industry code by the National Recovery Administration. Dr. A. Howard Meyers and John O'Donnell are the labor advisors.

The address of the Emergency National Committee is 110 West 40th Street, New York, and copies of the code are available through the Committee's office.

CYLINDERS
FOR
BOTTLED GAS



Properly Designed in Accordance with I.C.C. Regulations — Rigidly Inspected — Thoroughly Tested.

The majority of distributors of Liquefied Petroleum Gas now use Scaife Cylinders.

Modern Manufacturing Methods combined with an increasing demand have resulted in Scaife I.C.C. Cylinders being the most economical cylinder in use today.

Cylinders built to meet each purchaser's service requirements.

A large stock of cylinders of standard sizes insures prompt service. 130 years of experience in manufacture of steel products is behind each Scaife cylinder.

NRA MEMBER U.S. WE DO OUR PART

FOUNDED 1802

WM. B. SCAIFE & SONS CO.

Oakmont, Pa. (Pittsburgh District)

New York Pittsburgh Chicago

United Cities Utilities Co. Shows Big Increase in Domestic Meters

United Cities Utilities Co., Chicago, Ill., has more than doubled the number of meters served during the past 18 months, according to Arthur K. Lee, president of the company. On March 1, 1932 domestic meters numbered 1,788 while August 4, 1933 showed a total of 3,597. The company carries on butane service through the following subsidiaries: North American Utilities Co., Hastings, Minn.; Southwestern Wisconsin Gas Co.,

Tomah and Sparta, Wis.; Central Wisconsin Gas Co., Waupaca, Wis.; Southeastern Illinois Gas Co., Vandalia, Harrisburg, Eldorado and Metropolis, Ill.; Tennessee Gas Co., Union City, Columbia, Shelbyville, Murfreesboro, Maryville, and Morristown, Tenn.; Carolina Central Gas Co., Hendersonville, N. C.; South Carolina Gas Co., Gaffney, S. C.; and the Georgia Gas Co., Gainesville, Ga.

Indio Company Growing; Operates Cold Storage Plant

Southeastern Service Corp. which operates a central plant for service of butane-propane at Indio, Calif., has increased its customers from 25 in September, 1932, to over 250 at present, according to L. W. Thurlow, manager. New and larger office quarters have been taken on Fargo Avenue, and the gas plant on Wilson Street has been completely rebuilt.

Equipment is maintained at the gas plant for charging cylinders, and the company serves bottled gas throughout Coachella Valley.

Under Mr. Thurlow's direction a cold storage plant has been erected at the gas plant, utilizing the latent heat of evaporation of butane-propane. A high percentage of all barrel beer sold to dealers in the vicinity passes through the gas company's cold storage plant.

Wm. C. Lockwood Sec'y-Treasurer For United Cities Utilities

Wm. C. Lockwood, formerly with the Continental Illinois National Bank & Trust Co., Chicago, has been elected to succeed Otto von Schrader as secretary and treasurer of United Cities Utilities Co., Chicago, Ill. Mr. von Schrader passed away in October. The United Cities Utilities distributes butane through various subsidiaries in the middle west and south.

Colorado River Camp at Aqueduct Intake Gets Butane

Division 1 headquarters camp of Metropolitan Water District, located near the intake of the District's acqueduct at the Colorado River, 18 miles from Earp, Calif., is being equipped for butane gas service. American Liquid Gas Co., Los Angeles, is making the plant installation and will supply the fuel, the plant being identical in design to those already installed at several other Metropolitan Water District construction camps.

Another Orchard Heating System to Utilize Butane

Installation of a butane gas orchard-heating system was begun by Standard Oil Co. of Calif. in November, at the L. W. Allen 5-acre lemon grove near Yorba Linda in Orange County, Calif. This is the first system of the kind to be used in Orange County, though several have been installed in Los Angeles County.

Safety Regulations Developed for California Industry

Through the fire prevention committee of the California Oil and Gas Association a set of regulations concerning safe handling of liquefied petroleum gases was developed in November which has been submitted to the California Industrial Accident Commission. The Association has petitioned the Industrial Accident Commission to issue an emergency order making these regulations effective in California.

In the course of developing the regulations conferences were held with representation of state, county and municipal officials, equipment manufacturers and firms dealing in liquefied petroleum gases.

Standardization of nipples, valves, fittings, etc., for use with these gases in California is also being investigated by the fire prevention committee of the California Oil and Gas Association, according to D. S. Kilgore, acting manager and secretary of the Association.

R. W. Gallagher Heads S.O. of N. J. Natural Gas Operations

Election of R. W. Gallagher to the directorate of Standard Oil Co. of New Jersey, was announced in November. Mr. Gallagher, president of the East Ohio Gas Co., Cleveland, Ohio, will have general charge of the natural gas interests of the Standard organization, succeeding Christy Payne in this capacity, Mr. Payne having recently been elected vice-president and treasurer of Standard Oil of New Jersey.

R. W. Gallagher

Mr. Gallagher comes to his new office with a long record of service in the natural gas industry, having been president of the American Gas Association in 1932. His service with Standard began in 1896 since which he has held a number of executive offices with affiliated companies, in 1926 being made president of the East Ohio Gas Co. He will move to New York in connection with his new appointment.

Ratable Taking of Gas Ordered by Oklahoma Commission

Common purchasers of natural gas in Oklahoma have been ordered by the Corporation Commission to take gas on a ratable basis, the order functioning under Oklahoma's new proration law. A 40-acre unit basis is established in the order, common purchasers being directed to take gas equitably from wells in the Carney pool, Quinton field, Pittsburg County.

This decision is understood to be the first calling for ratable taking of gas from a gas field on the unit basis, and was issued to Oklahoma Natural Gas Corp., Southwestern Natural Gas Co., and Central States Light & Power Co., on application of certain well owners.

1933-1934 Calendar

December

Southern California Meter Association—7th Annual Hi-Jinks, Los Angeles, Calif., Dec. 16, 1933.

February

8th Mid-West Regional Gas Sales Conference (A. G. A.) — Hotel Sherman, Chicago, Ill., February 15, 16, 1934.

March

Oklahoma Utilities Association—16th Annual Convention, Tulsa, Okla., March 6, 7, 1934.

Southern Gas Association, Southern Regional Sales Conference (A.G.A.) and Southwestern Regional Sales Conference (A.G.A.) — Joint Meeting, Memphis, Tenn., latter part of March, 1934.

April

Mid-West Gas Association — Sioux City, Iowa, April 16, 17, 18, 1934.

May

Natural Gasoline Association of America—Tulsa, Okla., May 15, 16, 17.

International Petroleum Exposition —Tulsa, Okla.

October

American Gas Association — 16th Annual Convention, Atlantic City, N. J., Week of October 29, 1934.

Cedar Rapids to Have "Natural" From 40-Mile Line Now Building

Forty miles of 10-inch pipe line from a point near Ainsworth, Iowa, is being constructed by the United Light and Power Engineering and Construction Co., Chicago, Ill., to take natural gas to Cedar Rapids.

From the connection with the Natural Gas Pipeline Co. of America main line, near Ainsworth, the Cedar Rapids line will extend north, passing about one mile west of Iowa City near Coralville Heights.

The work started the latter part of November and is expected to be completed around January 1, 1934. E. L. Fischer, gas engineer of the company, is in charge of construction.

About $200,000 will be expended on change-over operations at Cedar Rapids Iowa, according to Mark Anderson, general manager Cedar Rapids Gas Co. Work was expected to be in progress late in November in preparation for the change-over. Construction and distribution departments of the company will be moved into larger quarters for the change-over project.

A regulating and measurement station will be built at the city limits, and gas will be odorized at this point. Work of converting the present plant at Cedar Rapids to manufacture 1000 B.t.u. oil gas for emergency use is also expected to begin shortly.

Northern Natural Send-Out Increases

Northern Natural Gas Co., headquartered in Chicago, Ill., during the summer of 1933 averaged a 55,000,000 cu. ft. daily send-out, as compared with a 30,000,000 cu. ft. daily average for the same period a year ago.

Coast Counties G. & E. Has Numerous Personnel Changes

J. B. WILSON, president of Coast Counties Gas and Electric Co., Santa Cruz, Calif., announces the following transfers effective in his company's staff:

Pierre Vinet, formerly sales manager in the Alta Building in Santa Cruz, has been transferred to the Pittsburg office as manager of the Contra Costa Division.

H. W. Edmund has been appointed sales manager for the Coast Counties system with headquarters in the Alta Building, Santa Cruz.

W. A. Clampitt, formerly acting division manager for the Contra Costa division, has been transferred as supervisor of sales and assistant division manager with headquarters in Pittsburg.

A. E. Hall, formerly headquartered in the Alta Building, Santa Cruz, is now located at Martinez in charge of Contra Costa gas operations.

A. R. Bailey, headquartered in the Alta Building, Santa Cruz, has been transferred to Watsonville in charge of gas operations for the Southern Division.

"Balanced Thrift Rate" Shows Good Results for Community

Community Natural Gas Co. has had a new rate in force for nearly a year in 100 towns served in Texas and Oklahoma, and reports considerable customer satisfaction from its use.

The "balanced thrift rate" eliminates the 50-cent ready-to-serve charge which is in effect elsewhere on the company's system. It provides a house heating rate as low as 45 cents per M c.f., which is in some cases a third less than the rate previously in effect. The rate increases slightly during the summer months which, with the reduced schedule for heating, results in lessening the seasonal variation in bills.

Foxboro Co. Issues Bulletin No. 185—Pressure Instruments

The Foxboro Co., Foxboro, Mass., has issued a new 40-page, illustrated booklet. Bulletin No. 185, describing the company's full line of pressure instruments—recording, controlling, and indicating. Copies may be obtained by addressing the company.

Peoples Gas Co. in New Offices at Somerset, Ky.

The Peoples Gas Co., Somerset, Ky., on November 10 formerly opened its new offices in the recently erected Beecher Smith Bldg. The new offices include ample display space for gas equipment sold by the company, together with storage room and repair shop.

United Gas Co. Extending Service to Easton

The United Gas Co. is making a short extension from its main line at a point about 12 miles east of Oakdale, La., running northeast to Easton where a stone quarry has been opened recently.

Determining Moisture Content

(Continued from Page 11)

atmospheric pressure and passing the low pressure gas through the apparatus. The galvanized iron container is then filled with water, and a flow of gas at the desired pressure is passed through the apparatus. The temperature of the water bath, which must be constantly agitated, is gradually decreased until a fog appears on the glass tube. The temperature of the bath at this point represents the dew point of the gas. It can be checked by increasing the temperature about 1°F. and observing that the fog disappears from the walls of the glass tube.

The sensitivity of the dew point method was checked by means of the saturator, Fig. 2, as well as against the drying tube method, and it is believed that the accuracy of this method is well within 1°F. A dew point determination can be completed in from 10 to 20 minutes.

Comparison of the Relative Merits of Dew Point and Drying Tube Methods

The dew point apparatus is small and compact and readily portable for field work while the drying tube method which requires the use of an analytical balance is not portable. The latter method also requires an operator with some special training, while the dew point method of operation can be acquired in a few minutes time by anyone.

If the atmospheric temperature is equal to, or higher than the gas temperature (usually ground temperature) the dew point method does not require the use of a heated jacket (Fig. 3, No. 3) because the valve where the gas is expanded from line pressure to

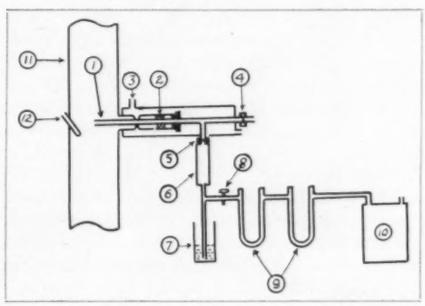


Fig. 3.

atmospheric pressure, is placed after the point where the dew point observation is made and hence any cooling at this point can do no harm. On the other hand, if the surrounding temperature is less than the dew point of the gas to be tested, all of the connecting tubing between the sample take off and the dew point apparatus must be heated.

The dew point apparatus cannot be used if there are any hydrocarbon vapors that will liquefy at or below the dew point of the water vapor because the liquefied hydrocarbons "wet" the walls of the glass tube and mask the characteristic white fog of the condensed water.

The dew point method will give the moisture content of a gas at any particular moment, while the drying tube method gives the average moisture content over any desired period of time from a couple of hours to a full day or more.

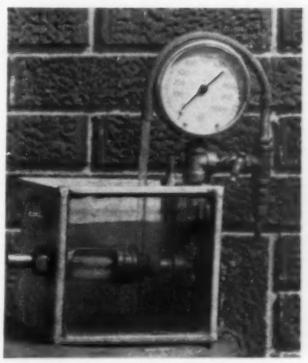


Fig. 4.

LITERATURE CITED:

(1) Selheimer, Souders, Smith and Brown, Ind. & Eng. Chemistry, Vol. 24, p. 516 (1932).

(2) E. R. Cox, Ind. & Eng. Chemistry, Vol. 15, p. 592 (1923).

(3) H. S. Bean, U. S. Bureau of Standards Research Paper 170.

(4) Smith, Brown & Ross, Ind. & Eng. Chemistry, Vol. 16, p. 20 (1924).

(5) Smith, G. F., "Drying Agents". (A Survey and Bibliography of their Properties, Uses and Theory). Published by J. T. Baker Chemical Co., Phillipsburg, N. J.

(6) Hougen & Watson, "Industrial Chemical Calculation", Jno. Wiley & Sons.

Taber Named D. M. at Muncie, Ind., for Central Public Service Co.

R. G. Taber has been named to take the post of district manager at Muncie, Ind., for Central Public Service Co. He will direct the company's operations in the Michigan and Indiana districts, going to that position from the Fall River Gas Co., Fall River, Mass., where he has resigned as vice-president.

Natural Gas to Keep Chicago Switches Operating This Coming Winter

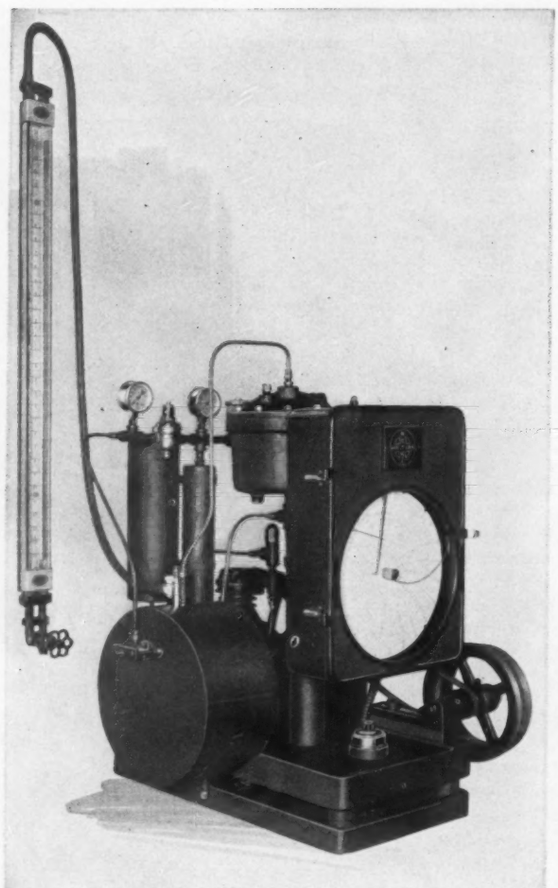
The Chicago Rapid Transit Co., Chicago, Ill., is planning to install gas heaters for the switch points in its Howard Street yard, to facilitate keeping switches in operation during the winter season.

MEASUREMENT and CONTROL

The Metric Gravitometer

By K. C. Tomlinson

*Assistant Manager, Pacific Meter Works, American Meter Company**



The Metric Gravitometer.

THE determination of the specific gravity of gases has been a matter of constant consideration by the Southern California Meter Association. Several papers have been prepared on this subject from time to time. Mr. Burton's paper on "Gravitometers," submitted at the December meeting of last year, and Mr. Fuller's discussion at the meeting last June both ably cover the field of development on this subject. Therefore, it is not necessary for us to consider the various methods in use at the present time.

We do realize, however, the necessity for accurate gravity determination, particularly in connection with the use of orifice meters. The accuracy of the orifice meter as a measuring device is not questioned. However, the determination of the correct coefficient for the orifice plate is a vital point since it varies inversely with the square root of the density of the gas being measured.

Previous discussions have indicated the resultant error in gas measurement from the incorrect determination of specific gravity and in large scale measurement this should not be ignored. The instrument to be used, therefore, should be consistent and dependable so as to give accurate results. Inasmuch as the density of the gas flowing through the orifice varies from time to time, "spot" sampling is not so satisfactory for proper determination and the continuous recording type instrument should be considered more desirable.

While there are instruments of this type now in use, we believe the Metric Gravitometer recently introduced by the Metric Metal Works will be of interest due to several desirable features incorporated in its construction.

The instrument determines the specific gravity of a gas by measuring and recording the differential or the centrifugal force produced by a fan rotating in the gas at constant speed by an electric motor. It automatically eliminates the effect of variations in atmospheric pressure and temperature and thus gives a correct gravity record.

The Metric Gravitometer is of strong and rigid construction. There are no delicate parts nor is it liable to get out of adjustment due to small jars. This feature is a distinct advantage since most instruments are delicate due to the fact that the specific gravity of gas as a rule is very small and satisfactory results are hard to obtain under the conditions ordinarily encountered in plant operation and in field work.

The accuracy of the instrument may be easily checked at zero and at 1.0 for the density of air. The zero point is checked by stopping the machine and allowing all pressure to be dissipated. The recording pen should rest on zero. The 1.0 point is checked by operating the instrument on air and from the construction of the machine intermediate points must be correct. If adjustments are necessary, they can be made quickly and simply as outlined later in this paper. The machine is completely and positively corrected for the ordinary changes of temperature and atmospheric pressure. Also, a burning gas jet gives constant indication that the sample is being continuously changed at the proper rate during its operation. The simplicity, rugged construction and easy reading as well as the absence of delicate parts are advantages found in the Metric Gravitometer.

The principal of operation is as follows: (See diagram):

K. C. Tomlinson

Gas at a low rate of flow, thereby giving a continuous sample, enters the blower at a pressure of 10 pounds through a pressure regulating valve "F" into what is known as the control chamber "B", passing from there into the center of the fan chamber "J" and finally to an adjustable burner attached to tube "L" to be burned. Between the control chamber "B" where the gas first enters and the fan chamber "J" there is a sealed chamber "H" in which a definite quantity of air is enclosed at a pressure of 30 inches mercury absolute and at a temperature of 60° F. The wall between the sealed chamber "H" and the control chamber "B" is a flexible metal diaphragm "A". Connecting with this diaphragm is a lever "C" which operates a regulator valve "F" which in turn controls the pressure of the gas within the control chamber "B". All three chambers referred to are enclosed within an asbestos lined jacket so that the temperatures of the gas within all three (control chamber "B", sealed chamber "H" and fan chamber "J") will be the same. The unit is constructed of bronze with fins wherever practical so that the heat may be rapidly transferred from each of these chambers to the other thereby equalizing the temperature.

Inasmuch as the sealed chamber has a definite quantity of air enclosed, if the temperature increases the pressure within will also increase. Likewise, if the temperature decreases, there will be a decrease in pressure. However, it is evident that the density or weight per cubic foot will remain a constant assuming that there is no change of volume due to the movement of the walls of the chamber. If, due to changes or pressure or temperature, the pressure within the control chamber "B" is less than the pressure within the sealed chamber "H", diaphragm "A" will be moved to the left opening valve

* Presented before the Southern California Meter Association, October 26, 1933.

"F" and admitting gas to the control chamber, thereby increasing the pressure in the control chamber "B" until it is the same as the pressure in the sealed chamber. Likewise, if, due to changes in pressure or temperature, the pressure within the control chamber is greater than the pressure within the sealed chamber, diaphragm "A" will be moved to the right, closing valve "F" and reducing the pressure within the control chamber on account of consumption at the burner until the pressure becomes equal to that within the sealed chamber. By this operation the pressure within the control chamber can always be maintained equal to the pressure within the sealed chamber and, since the pressures and temperatures in both chambers are maintained the same, the effect of pressure and temperature on the density of the gas is maintained constant inasmuch as the density of the air within the sealed chamber is constant. If air is admitted the density within the chambers referred to will be exactly the same. If gas be admitted to the control chamber, any change in its density will be due only to a change in specific gravity which, as we know, is the relative weight of gas to air under the same conditions of pressure and temperature.

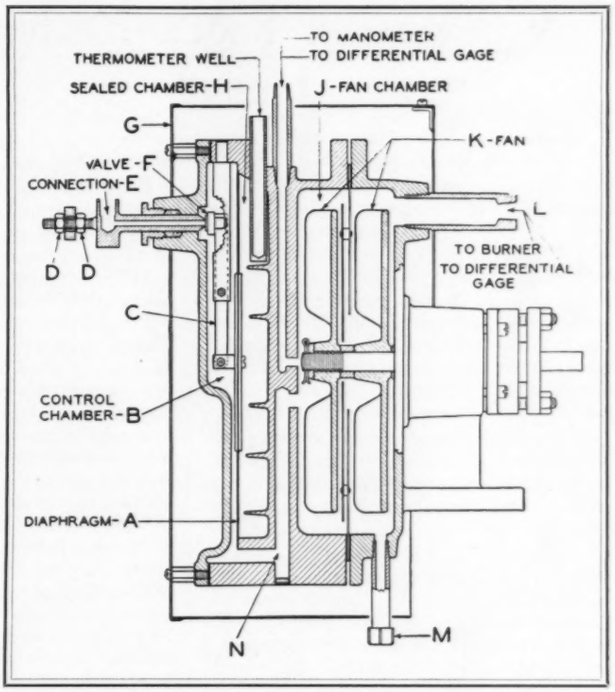
Since all effect on the density due to a change in temperature and pressure is automatically eliminated in the operation of a centrifugal fan or blower, the differential pressure developed between the center of the fan and tips of the blades when running at a constant speed will vary only with a change in specific gravity.

If the differential pressure produced by the blower when rotating in air is one, as indicated on the chart, the differential pressure produced by the blower when rotating in gas will be the specific gravity of the gas. As an example, if the differential pressure produced when using air is 5 inches of water, the differential pressure produced by gas having a specific gravity of .6 would be 3 inches of water or .6 of that produced by air. It must be understood that the speed of the blower must be constant at all times and this condition is maintained by using a synchronous motor which, on 60 cycle current, develops 3600 r.p.m. Therefore, the pen will record on the chart at a position corresponding to the differential pressure produced by the fan in the gas. Any change in the differential will depend entirely upon changes in specific gravity, so that the chart will record such variations at any particular time during the 24-hour period and an average specific gravity can be easily obtained from the chart for any given period.

The gravitometer is mounted on a solid base free from vibration and should be located where the temperature will not be less than 50° F. Temperatures up to 120° F. will not affect the operation. Electric current generally used must be constant frequency 60 cycle, 110 volt alternating current.

Gas pressure required for the operation of this instrument should be not less than 20 pounds and the instrument is equipped with a compressor for use where air and gas are not available at this pressure. If gas pressure is available at 20 pounds or more the compressor is only used when checking the instrument on air. Pressure on the control chamber, however, is maintained constantly at 10 pounds and small adjustments on the regulator may be necessary to maintain an even pressure. Temperature conditions within the insulated chambers are indicated by a thermometer placed in a well on top of the blower.

AT RIGHT:
Diagram showing construction of Metric Gravitometer.



In checking the gravitometer with air to determine whether or not the pen reads 1.00 on the chart, the motor should be allowed to run for a considerable period of time until the blower is warmed by the operation of the fan. This is necessary before making final checks so that a temperature equilibrium will be established within the blower unit. This precaution would not be necessary in continuous operation on gas as any changes in continuous operation will be gradual enough that the machine can adjust itself to any changes.

By referring to tables supplied with the instrument, a manometer may be used to check the pressure developed by the blower according to prevailing temperature and pressure conditions and the pen should be adjusted so that for air, it will indicate exactly 1.00 on the chart and when the motor is stopped, the pen should rest on zero. If the pressure indicated by the manometer is correct and the pen does not rest at the proper points, adjustments can be made on the length of the float lever in the mercury gauge if necessary. These adjustments are easily made and the possibility of an absolute check on the accuracy of the instrument is an important factor. The instrument requires only the usual attention relative to the operation of small motors and compressors. It is equipped with drains and other connections for the removal of oil and mercury when trapped. The compressor is equipped with three step pulleys so that the speed can be varied to maintain sufficient pressure when operating on very light gases.

Since the chart records continuously the specific gravity of the gas under test, this instrument will give as a permanent record the variations in the specific gravity of the gas flow. A true correction can then be applied resulting in more accurate measurement.

31 Firms Represented at 5th Exhibitors Meeting

WITH a record number of firms participating, Southern California Meter Association's Fifth Annual Exhibitors' Meeting took place in the auditorium of the Los Angeles Gas & Electric Corp., on November 23. Some 31 different displays were set up for the occasion and the attendance ran close to 200.

At the annual S. C. M. A. exhibits considerable equipment receives its first showing, and a wide assortment of apparatus in the field of measurement and control is included in the exhibit. Among equipment on display this year were valves of several makes, specific gravity apparatus, gauges, meters, regulators, specialties for the butane-propane industry, various types of industrial control instruments, orifice fittings, liquid level controllers, gas burners, pipe protective material, meter runs, thermometers, and numerous other items.

The exhibits were open from 4:30 p. m. to 10 p. m., with time out for a business program. There was no general dinner, though the board of directors held a dinner session.

President C. B. Heartwell called the business meeting into session at 7:30. F. G. Philo, superintendent of steam generation for Southern California Edison Co., Ltd., gave a very complete paper on the subject, "Measurement and Combustion Control of Natural Gas in a Large Central Station." He dealt with natural gas utilization under boilers at the Edison Co.'s Long Beach steam plant, the paper being illustrated by numerous slides. J. R. Zeigler of the Edison Co. assisted Mr. Philo in showing the slides. The paper will appear in an early issue of *Western Gas.*

Several of the Association's membership assisted in arrangements for the successful exhibit, among them P. W. Hill, L. P. W. DesBrisay, E. Lorenz, and Frank Fields.

A Successful Space Heater Activity

IN A community which this year rounds out a half century of the domestic use of natural gas, employees of the three local natural gas companies have proven that the saturation point of space heater sales is far from reached and that the public can be put in a buying mood if active enough selling methods are employed.

An intensive 30-day campaign conducted exclusively by employees of The Equitable Gas Co., The Manufacturers Light and Heat Co., and the Peoples Natural Gas Co., of Pittsburgh, has resulted in the sale of more than 14,000 of one make of radiant heater.

The activity exceeded by more than 200 per cent the quota of 4,500 agreed upon by the three companies before the campaign was started. Each company took a quota of 1,500 heaters at the start.

The total of employee sales was for the Humphrey Radiantfire and does not include hundreds of other appliances sold or the decided pickup in dealer and department store sales resulting from an intensive joint newspaper and radio advertising campaign carried on by the three companies, primarily to back up the employee selling activity.

While advertising was designed to encourage the sale of all types and prices of radiant heaters by dealers as well as company employees, a leader was used in the $16 Humphrey heater at a special price of $9.85, without the make being identified. Thousands of other heaters were sold as a result of the intensive activity.

Advertising was conducted jointly by the three companies but actual selling activities were carried on independently in competition for a cup awarded to the company making the largest total sales. The cup was won by The Peoples Natural Gas Co. which sold 5,777 heaters.

Winning Company's Methods

The organization set-up and facilities for a constant check on lagging participation, as used by The Peoples Natural Gas Co., is an example of methods which encourage maximum employee participation in company campaigns.

Early in the preliminary arrangements quota were established for each of the company's districts, according to the number of employees, number of meters and general business conditions in each territory. These quotas totaled a company quota of 2,403 instead of the 1,500 quota which was accepted at first by all of the companies.

The campaign was introduced with a meeting of field foremen and agents after which these men returned to their respective districts and formed sales organizations. Each divisional organization was then visited from one to three times and the employees instructed in the plan of the campaign and selling methods. While this was going on meter readers distributed a folder to all consumers describing the special radiant heater offer and explaining terms.

The company centered the campaign around a mythical around-the-world airplane flight with each employee as a pilot and every 10 pilots under a squadron commander whose work it was to keep a close check on the progress of each of his pilots and stimulate activity whenever necessary.

Daily bulletins and a world map with a tiny airplane for each district, indicated the relative standing of each district from day to day. Reports were made by all employees at 10 a.m. each day and these were consolidated daily at headquarters.

In addition to sales commissions, weekly cash awards were made to the three highest in sales. Grand cash prizes were given to the six sales leaders in the company at the end of the campaign. The office or plant organization making the largest total sales also received a cash prize which was distributed among employees of the division according to the total sales made by each. In this manner the campaign was not permitted to lag, recognition was given for weekly activity as well as total individual sales for the campaign, and every employee who made a sale was "in the money" at the end in proportion to the sales he had made. Certificates of achievement were awarded to each company district which exceeded its quota.

The actual total of sales for the one make of radiant heater was 14,094 of which The Equitable Gas Co. sold 3,626; The Manufacturers Light and Heat Co. sold 4,691, and The Peoples Natural Gas Co. sold 5,777.

The detailed campaign for the Peoples Natural Gas Co. was worked out by Ketchum, MacLeod and Grove, Inc., Pittsburgh, the advertising agency which serves all of the companies in a year-around joint advertising and public relations program.

Death Takes F. R. Norgren From Cities Service

Floyd R. Norgren died suddenly in Kansas City, Mo., on October 20, as a result of a heart attack. Although employed for the past few years with Cities Service Oil Co. at Tulsa, Okla., as sales director in charge of sales promotion, Mr. Norgren was well known in the gas industry from his earlier work. Beginning with the Spokane Gas and Fuel Co. in 1916 as new business representative he was made new business manager for that company in 1920. In 1925 he was transferred to the Gas Service Co., shortly after its organization, and made assistant to F. M. Rosenkrans, new business manager. He remained in that capacity until November 1, 1927, going then to the customer ownership division of the Cities Service securities department. Less than a year later he was made new business manager of the Capitol Gas and Electric Co. at Topeka, Kan. and went to the Cities Service Oil Co. in 1929. He was 35 years old.

7th Hi-Jinks—December 16

Southern California Meter Association will stage its 7th Annual Hi-Jinks on Dec. 16, the affair being held for the third consecutive year at the Central Manufacturers' Club, Central Manufacturing District, Administration building, Vernon, Calif.

Costs of Government in Oklahoma Subject of Ph. D. Thesis

The Oklahoma State Chamber of Commerce has released to its members the complete study of the functional cost of government in Oklahoma, which was offered June 5 by its author John M. Ashton, as a thesis, to the graduating faculty of the University of Oklahoma, by whom it was accepted, and upon which the degree of Doctor of Philosophy was conferred upon the author. The study comprises about 150 multigraphed pages and is an exhaustive analysis. Table No. 61 of this study deals with operation of water, light, gas and airport services by municipalities of the state, for 1931, and sets forth the conclusion that for that year municipal operation of such services in Oklahoma resulted in a total loss of $2,291,638.

Stainless Steel Discussed Before Cincinnati A. S. M. E. Group

"Industrial Uses of Stainless Steel" was the title of a talk delivered before a meeting of the American Society of Mechanical Engineers at Cincinnati, Ohio, November 23, by C. C. Snyder of the Central Alloy Division, Republic Steel Corp., Massillon, Ohio. Mr. Snyder reviewed the development of stainless steel, gave general characteristics and properties of the different types of stainless steel and stressed the rapidly increasing use of stainless steel in various industries. Lantern slides were used to illustrate a number of typical installations of Enduro Stainless Steel.

Caruthers and Del Rey Served by So. Calif. Gas

Five miles of 2-inch line has been completed by Southern California Gas Co. to link the town of Caruthers, west of Hanford, Calif. to the company system. Southern California Gas Co. is also serving the town of Del Rey in its San Joaquin Valley division for the first time. Eight miles of 2-inch main is being laid to the town, which is located north of Reedley.

Old-Range Contest Organized by Vancouver Company

Home Service News, customer magazine of British Columbia Electric Railway Co., in its November issue announces an old gas range contest. The owner of the oldest gas range on the company's system will be given a new gas range fully connected, in exchange for the old one. The customer will be allowed to pick out a range from the company's showrooms, up to the value of $125.

P. W. Hill Chairman of S.C.M.A. Entertainment Committee

P. W. Hill, of the General Petroleum Corp. has been appointed by President C. B. Heartwell to take over the office of entertainment committee chairman for the Southern California Meter Association following the resignation of Ralph L. Cook who is now located at Taft, Calif., as announced elsewhere in this issue.

Interstate Transportation Declines Slightly in 1932

The total movement of natural gas across state lines in 1932 totaled 331,473,000,000 cubic feet, a slight decline from 1931. This decline resulted primarily from a decrease in the demand for industrial purposes, as the domestic and commercial consumption increased.

Louisiana led all the States in interstate shipments, with Texas a close second. The two largest interstate movements were those from Louisiana to Texas and from West Virginia to Ohio; these totaled 43,641,000,000 and 39,547,000,000 cubic feet, respectively, in 1932.

State-by-state details concerning interstate movement of natural gas last year are available in Mineral Market Reports No. M. M. S. 236, issued under date of November 10 by the Petroleum Economics Division, U. S. Bureau of Mines, of which E. B. Swanson is chief economist.

Tentative Dates Set for 1934 Meeting of Nat. Gasoline Ass'n.

Ray E. Miller, secretary of the Natural Gasoline Association of America, has announced tentative dates for the 1934 meeting of the Association at Tulsa, Okla., as May 15, 16 and 17. The dates were selected so as to precede and not interfere with the mid-year meeting of the American Petroleum Institute in Pittsburgh, May 22, 23 and 24, and to follow the meeting of the Natural Gas Department of the American Gas Association, which is expected to be held early in May.

Thomas W. Stone, Western Gas Co. Official Passes

Thomas W. Stone, vice-president and general manager of the Western Gas Construction Co., passed away on September 27, following a stroke of apoplexy. He was 55 years of age. After receiving his technical training at Ohio State University he accepted a position in 1902 as draftsman for the Western Gas Construction Co., and 11 years later was made chief engineer. In 1928 he became vice-president of the company and in 1931 general manager.

Pierre, S. Dak., to Rebuild City Gas System

Pierre, S. D., is going ahead with plans to rebuild its city gas system, according to John E. Hipple, mayor. The system formerly metered 70,000,000 cu. ft. into mains in 30 months, all but 25,000,000 cu. ft. escaping. The city made application about a year ago for R. F. C. funds to cover this project, but recently cancelled the application.

New Gas Well for South Baxter Basin, Wyo.

Wyoming California Petroleum Co., subsidiary of the Holly Development Co., Huntington Beach, Calif., late in October brought in a new gas well in South Baxter Basin, Wyo., estimated at 35,000,000 cu. ft. capacity in daily flow.

San Diego County Dealers Organize

By FORREST M. RAYMOND

Advertising Manager

*San Diego Consolidated Gas & Electric Company**

FOR many years past it has been common practice among both gas and electric utility advertising departments to consider a "see your dealer" line at the bottom of promotional advertisements, as a sufficient gesture in the direction of dealer cooperation. In addition to that, most of us had extra proofs struck off and circulated among the dealers with the suggestion that tie-in copy over their own signature would be very effective and productive of immediate business. Some even went so far as to offer cooperative prizes and to send members of their sales promotional departments out among dealers to address their individual sales forces at so-called "pep" rallies.

Perhaps this was going far enough, but I am sure it is the general feeling that advertising and promotional dollars so expended did not reach their *nth* degree of efficiency, neither was there a sincere appreciative response on the part of dealers. Too often was it the case that dealers were not financially able to cooperate with tie-in advertising and the vague reference of "see your dealer" was not definite enough to merit credit for any business done during the sale period.

About two years ago there was formed in San Diego what was known as the Electric Refrigeration Bureau. Luncheon meetings were held twice monthly and advertising plans and promotional activities were discussed and carried on as a unified effort. A headquarters was established and all newspaper advertising with reference to electric refrigeration carried the bureau name, telephone number and address of the bureau headquarters. The fact that these men—wholesale and retail dealers in electric refrigeration—had a say as to the "what, when and where" of sales drives produced the desire to tie-in with the activity and an appreciation of what money was expended in bureau work on the part of the electric utility.

Patterned after the Electric Refrigeration Bureau, a group of gas appliance dealers recently organized under the name of the Gas Appliance Association of San Diego County. One of the association's first moves was the formation of an advertising committee of five members to lay out a program to cover sales efforts during the balance of 1933 and throughout the heating season of 1934. A definite amount of money was set aside by the promotional department of the San Diego Consolidated Gas & Electric Co. to be expended according to a schedule outlined by this committee. Advertising costs were laid before the group and the midnight oil was burned on several occasions trying to make a well-rounded program fit a definite expenditure. The direct result was a very definite appreciation of moneys allotted to the industry for dealer-cooperative work. The findings of this advertising committee were periodically reported to the entire organization, both personally and by bulletin. Two advertising campaigns have now been instigated and completed over the name of the "Gas Appliance Association of San Diego County" and despite the retarding effect of a sales tax and general uncertain conditions, dealers reported favorable business and gave credit to their affiliation with the association.

Mediums used in these advertising campaigns included metropolitan newspapers, street railway dash cards and radio time signals. The subjects of trade-ins, low down payments, and ridiculously low cash prizes were noticeably absent, both in advertising appearing over the association's name and over the names of association members.

"Fair competition" was the theme employed in promoting Range Week, September 18th to 23rd, with the slogan of "Buy Her a Modern Range and Join the Parade of Fair Competition".

Considerable attention is now being given to a forceful campaign to promote gas heating. It is the advice of the association's advertising committee, that all cooperative copy carry suggestive inducements to buy the various types of gas heating appliances with each ad featuring one specific type.

With the formation of a Gas Appliance Code under the National Recovery Act, several furniture dealers withdrew their financial support from the Gas Association in favor of an Association of Furniture Dealers, because of many duplicating interests. However, the furniture association is cooperating 100 per cent with the Gas Association, and both the range campaign and the coming heating activity will represent a combined sales effort.

The San Diego Consolidated Gas & Electric Co. is now considering something different in the way of dealer cooperation from a standpoint of more direct advertising—a plan suggested by one of the largest gas appliance dealers. The San Diego company is investigating the advisability of establishing a point system for all types of appliances sold by the dealers, these points to be redeemable as a cash bonus to be expended in newspaper advertising over the signature of the dealer earning the points. For instance, a gas furnace installation selling at $500 would entitle the dealer to approximately $30 worth of advertising, with all appliances earning a proportionate amount.

* Presented before the Pacific Coast Gas Association's Publicity and Advertising Section, at the September, 1933, Annual Convention.

Southern Counties Co. Re-laying 7,200 Feet of Pipe

The Southern Counties Gas Co., Los Angeles, Calif., is re-laying 7,200 feet of 8-inch gas pipe in a section of its line from Brea to Pomona on the west side of the recently rebuilt Brea canyon summit highway. This pipe was removed from the ground bordering the old highway and is being laid at a depth of 42 inches along the new highway route.

Progress in Substitute Gas Manufacture

(Continued from Page 15)

5. A greater tendency of carbon deposition in the super heater as compared to 520 B.t.u. operation. The burning of this carbon during fire cleaning causes excessive temperatures at the superheater top.

6. The therm output per machine is more than in the case of 520 B.t.u. operation.

7. Recheckering carburetors and superheaters depends on quality of oil. Carburetter recheckering was necessary after a run of 155 hours.

RECIRCULATED OIL GAS PROCESS

The Production Committee Report also includes details of a new process known as the "Recirculated Oil Gas Process." This process is reported by E. S. Pettyjohn, research engineer, University of Michigan, who outlines the process as follows:

The Recirculated Oil Gas Process was designed to provide both the necessary control of time of contact and of temperature to produce a gas of high methane content without the formation of lamp black. The oil to be cracked is atomized into the top of the carburetor through a standard type oil spray. The atomized particles are vaporized and partially cracked as they are carried rapidly forward by steam superheated in the checker bricks which have been substituted for the fuel bed in the generator to increase the available heat storage capacity. As this mixture reaches the base of the carburetter part of it is withdrawn through an auxiliary line and recirculated through the generator and carburetor, increasing the velocity of the atomized oil particles through these high temperature zones. The remainder of the partially cracked oil vapor passes upward through the superheater at a rate which allows a longer time of contact in this lower temperature zone. By varying both the portion of the oil run during which the partially cracked oil gas is recirculated, and the quantity recirculated through changing the volume of steam admitted to the aspirator, the quality of the finished gas may be controlled.

A limited test of this process was made with a 10-foot set in a community which has recently been changed over to straight natural gas. The conclusions of this test are:

From these results it may be seen that the recirculated oil gas process may be used to produce a high-heating-value gas which may be mixed with and substituted for natural gas in appreciable quantities for short periods of time. The upper limit was not determined, but it is believable that complete substitution is possible.

1100 B.t.u. gas was made with less than 11 gallons of oil M c.f. It is believed that this quantity can be reduced with additional operating experience, provided the by-product tar is used for under-firing the machine.

All of the tar produced by the process may be returned to the generator as either heating-up tar, burner tar, or backrun tar. There are no other by-products or waste products. The process was operated with less than 11 pounds of steam per M c.f. It is believed this quantity can be reduced, if not eliminated, by generating the process steam within the machine.

Sufficient capacity was obtained during the test to provide against peak loads and even complete failures of supply, and it is believed that this capacity can be increased with further experience.

The modifications to the standard three-shell water gas machine are both easily and inexpensively made, and can be installed or withdrawn in a reasonable length of time. The process can be operated with a minimum quantity of labor, as with automatic control and hydraulic operation one gas maker per shift is sufficient.

CALIFORNIA

On the Pacific Coast additional experiments and operations have been conducted in the manufacture of high B.t.u. oil gas. Detailed reports of these experiments are given in the report of the Production Committee of the Pacific Gas Association. This report is published in the September, 1933, issue of *Western Gas*. (See also *Western Gas* for August, 1932.)

The report covers operations by the Pacific Gas and Electric Co. in December, 1932, in five of their plants, when their transmission system was overloaded and it was necessary to augment the supply of natural gas. The Los Angeles Gas and Electric Corp. conducted tests in February, 1933, and the San Diego Consolidated Gas and Electric Co. conducted tests in April, 1933. Since the report of these operations is available to those interested, only the conclusions will be mentioned, due to the limited time available for this subject.

The conclusions made by the San Diego company agree very closely with those reached by the other companies, and are quoted as follows:

1. That a high heat value, high gravity oil gas interchangeable with natural gas can be manufactured in any standard oil gas generator without structural changes of any kind, using diesel engine oil or similar oil as the raw fuel.

2. That the volumetric capacity of the plant can be substantially increased.

3. That the thermal capacity of the plant can be increased in greater than direct proportion to the increase in B.t.u. of the gas made.

4. That the cost of production on a thermal basis will be definitely less than the cost of 550 B.t.u. gas from fuel oil, assuming a reasonable price differential between the fuel oil and the diesel oil, such as exists at present.

5. That the by-product (tar) will be of more value and entail less expense in handling than the former tar and lampblack, becoming an asset rather than an expensive nuisance.

6. That in case of a permanent failure of natural gas, this gas merits consideration before a return to former practices.

7. That a gas of 925-950 B.t.u. and 64-65 gravity appears ideally adapted to our conditions.

8. That the unsaturated hydro-carbons in a richer gas constitute a loss to the manufacturer with no appreciable advantage gained by the customer.

In general the gas produced in these operations gave satisfactory service and detailed accounts of tests on various appliances are included in the committee report.

CONCLUSIONS

It is evident that the engineer faced with the problem of making substitute gas has a wide selection of processes available but limited information regarding them. The equipment at hand and fuels available will play a large part in the selection of the process to be used, but in each case considerable thought will be required before the selection of the process. The selection of the process must then, in each case, be followed by experiments to insure satisfactory operation in any emergencies which may arise.

The policy of publishing reports of the operations and results in various plants is to be commended, and since only limited operations are conducted in any case, the cooperation of the members of the industry is essential in arriving at the most satisfactory means of providing continuous service to our customers.

Joint Sessions Due at Memphis in March, 1934

Memphis, Tenn., has been selected as the Southern Gas Association convention city in 1934, according to a decision made by the Time and Place Committee of the Association. The meeting will be held the latter part of March in conjunction with joint meetings of the Southern Regional Sales Conference, and the Southwestern Regional Sales Conference, of the American Gas Association.

The following committees are serving for the 1933-34 Southern Gas Association year:

Commercial Section

Chairman: W. A. Hudson. Birmingham Gas Co., Birmingham, Ala.; vice-chairman: W. D. Adams, Memphis Power and Light Co., Memphis, Tenn.

Technical Section

Chairman: S. L. Duckett, Southern Public Utilities Corp., Charlotte, N. C.; vice-chairman: C. L. Nairne, New Orleans Public Service Inc., New Orleans, La.

Industrial Section

Chairman: O. F. Reynolds, Chattanooga Gas Co., Chattanooga, Tenn.; vice-chairman: A. M. Spencer, Columbus Electric & Power Co., Columbus, Ga.

Sectional Managing Committee of the American Gas Association

Accounting Section: W. H. Kennedy, Birmingham Gas Co., Birmingham, Ala.

Commercial Section: E. N. Avegno, New Orleans Public Service Inc., New Orleans, La.

Industrial Section: L. H. Hungate, Jr. Memphis Power and Light Co., Memphis, Tenn.

Manufacturers' Section: E. S. Dickey, Maryland Meter Works, Baltimore, Md.

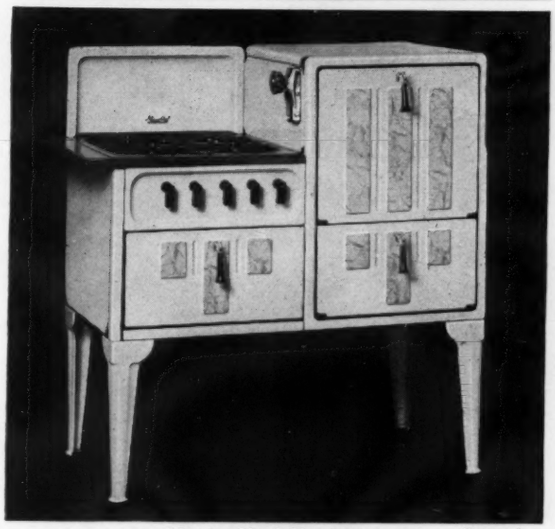
Publicity and Advertising Section: E. J. McClinchey, Knoxville Gas Co., Knoxville, Tenn.

Technical Section: T. B. Hopper, Washington Gas Light Co., Washington, D. C.

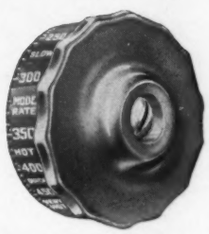
The joint program committees arranging details for the meetings will convene in Memphis on December 8, 1933, to formulate the program, according to S. L. Drumm, secretary-treasurer of the Southern Gas Association.

Magic Chef

AMERICAN STOVE COMPANY



Magic Chef No. 204-0 Patented



Look for the RED WHEEL
When you buy a MAGIC CHEF

Magic Chef No. 1202-3 Patented

THE NEW
MAGIC CHEF MODELS
SERIES 1200 and 200

THESE beautiful Magic Chef Series offer to gas companies and dealers an unequalled sales opportunity.

Magic Chef No. 204-0 shown at top left, is porcelain enameled in Old Ivory and Green with panels in Green Marble effect.

Magic Chef No. 1202-3 is porcelain enameled in Ivory and Green with panels and back splashers decorated with an artistic tile design.

These new Magic Chef ranges come in various other attractive color combinations.

In the Series 1200 the cooking top is flush with the oven top to permit easy sliding back and forth of oven utensils. The cooking top section has a folding top buffet coverall to conceal grates when not in use. In Series 1200 a convenient drawer-type broiling compartment containing the famous Grid-Pan Broiler is a special feature.

Other Magic Chef features include the Magic Chef Non-Clog Burners, the Magic Chef High Burner Tray, the Magic Chef Automatic Top Lighter, fully insulated ovens, roomy service drawers and the famous Red Wheel Lorain Oven Regulator. Any range in these series equipped with Telechron Electric Time-Control Clock at extra cost if desired. Write for color illustrations and full description.

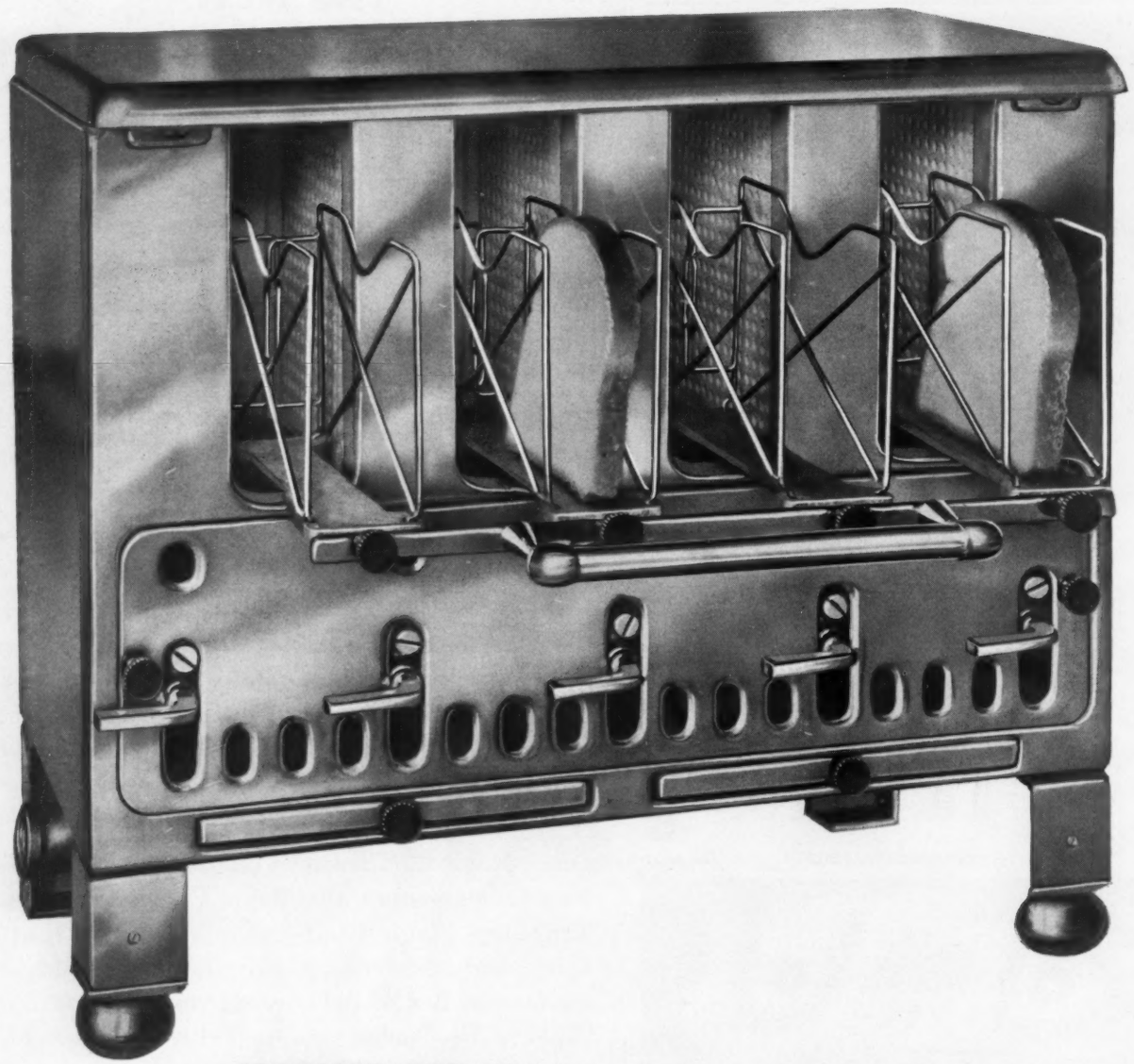
AMERICAN STOVE COMPANY

World's Largest Manufacturer of Gas Ranges

BOSTON · · · · NEW YORK · · · · PHILADELPHIA
ATLANTA · · · · CLEVELAND · · · · CHICAGO
ST. LOUIS · · · LOS ANGELES · · · SAN FRANCISCO

EXTRA GAS APPLIANCE SALES

NEW VULCAN



SPECIFICATIONS: **Size 17″ wide, 9″ deep, 15″ high. Four toasting compartments, each operated independently, each lined with heating elements of ceramic material that quickly radiates intense heat. Maximum gas consumption when all four burners are lighted—15 cubic feet per hour. Visible toast racks are made so that four slices, four sandwiches or four English muffins can be toasted simultaneously. Sheet metal sides and back, cast iron front. Simple and sturdy construction—practically no upkeep cost. Made in three finishes.**

Black porcelain enamel with nickel trim
White porcelain enamel with nickel trim

Allegheny Metal with nickel trim
Chromium trim can be supplied on special order

WITH THE

GAS TOASTER

Better toast—by an improved method—quicker—far cheaper than ever before—without service and repair costs—gives each of your salesmen a bang-up new selling story for many new prospects every day.

Along routes traveled daily by your salesmen are many businesses to which this newest Vulcan salesmaking gas appliance will be not just new—but NEWS! Restaurants, lunchrooms, soda fountains, sandwich shops—all can use, and *none has ever seen*, a toaster like this.

Your salesman goes to these prospects with a 3-fold sales story of tremendous and simple appeal:

1. He is selling *better toast*, with the new Vulcan, and many a food reputation has been built on less! Bread is quickly seared on the surface only, then crisped, evenly, to any desired point while the inside preserves a fresh-from-the-oven softness. Slices, sandwiches, muffins, are done with equal ease.
2. Your man is selling *drastic savings* with the new Vulcan. Purchase price sets a history-making low in the field. Gas use is low, with a 15 cu. ft. per hour maximum. No moving parts or delicate adjustments to require servicing.
3. He is selling *new convenience* with the new Vulcan. Toast is always visible. When toaster racks are pulled out the gas is automatically lowered, leaving enough gas to keep the radiants fairly hot. When the rack is pushed back into position, the full supply of gas comes on. Heating elements reach the ideal toasting temperature almost instantly; toast completed in 55 to 70 seconds.

We urge you to get your men selling this new Vulcan toaster at once. It offers a rare chance to pull large and profitable extra sales out of your present force and set-up.

The Vulcan Gas Toaster and the new Vulcan Counter Fryer are the latest additions to the wide line of heavy duty gas equipment manufactured by

STANDARD GAS EQUIPMENT CORPORATION

18 East 41st Street, New York, N. Y.

BALTIMORE : PHILADELPHIA : AURORA : BOSTON : CHICAGO : BIRMINGHAM

Pacific Coast Distributors

NORTHWEST GAS & ELECTRIC EQUIPMENT CO.

PORTLAND, OREGON LOS ANGELES, CALIF.

Some Principles of Class Rates

(Continued from Page 8)

building heating field. Because of difference in climatic conditions and the much greater use of steam heat in apartments in our territory, this field was very much larger than in the south and also much more attractive as to load characteristics. A survey showed some 7,000 or 8,000 commercial buildings as prospects for gas heating, now almost universally heated with fuel oil burned under steam boilers. This, of course, meant that, in order to displace oil, gas must be sold at rates much below the general service schedule, and yet, because of the greater convenience of gas as compared with oil, the saving of labor, with electricity for atomizing and other incidental expenses, the price of gas need not be as low as in the large industrial field. The point there is that the industrial plants usually have men present anyway so that there can not be counted much saving of labor in the firing of boilers, whereas, in the office building or apartment house the reverse is true. The attendance necessary for burning oil under the ordinary steam boiler can be dispensed with when burning gas.

It also was plain that this class of business should not in general be subject to shut-off and that even though consumers might be willing to accept the shut-off provision and take their chance in order to get the much lower rates at which surplus gas was being offered on the shut-off contract, we did not believe it would be in the public interest to permit them to do so. A few of the larger buildings might reasonably be classed with the industrial plants in this respect. Such buildings would usually have plant engineers on regular duty in any event. Therefore, the labor saving due to use of gas would be small and at the same time substitution of oil in case of gas shut-off could readily be made. Also there would be no difficulty for the company's gas control to communicate with these few buildings and make shut-off arrangements in case of need. Obviously, that would not be practical with some 6000 or 8000 buildings scattered over all the territory. We, therefore, decided upon a brand new departure in this, that is, the establishment of a special class to be known as commercial building heating and an intermediate rate level providing for gas service not subject to shut-off, but restricted to locations along lines where the company had sufficient capacity for this additional load without injury to the service to other consumers. That is the wording, or substantially the wording, which appears on the heading of our commercial building heating schedule.

As this class of business would not be subject to shut-off and would have a pronounced winter season peak, it was logical to include in the schedule form a demand charge element—in other words, to make it a two-part rate similar to the well known demand and energy form electric schedules. This could readily be done by making use of the already established American Gas Association standard ratings for warm air furnaces and low pressure steam boilers in the same way that the general power schedule in the electric field makes use of the name plate rating of motors. Thus the new commercial building heating schedule, as we have called it, favors the high load factor consumer, that is, the consumer whose annual use in cubic feet is high in relation to the maximum rate at which he may draw upon our lines in cold seasons. This is desirable wherever, as here, competitive conditions with other fuels would be such that we could not expect to get the entire potential business and would prefer to get the high load factor business, leaving the short season user to fuel oil, by which fuel such users could be more economically supplied.

Surveys by the sales department indicated that the smallest of these commercial buildings would pay for gas rates about up to the general service schedule level, but that the largest ones would pay only about 20 per cent more than the cost of equal heat in fuel oil, and studies of our transmission and distribution costs at the same time indicated that these rates would be somewhat in excess of the additional cost; therefore, the taking on of such additional load must eventually be a benefit to other classes of consumers, particularly domestic and commercial cooking.

It is perhaps natural that other classes should at once demand service on the new commercial building heating schedule, but I believe it is clear from what has been said that they must be denied on the ground of the interest of the rank and file of domestic and commercial consumers. Those who are already receiving service on the general schedule, and certainly if they had been using manufactured gas for the same purpose, could not justly complain of discrimination because a newer and lower schedule is offered a new class of business not heretofore served with gas at all, when the effect of this new business must eventually be to the benefit of all consumers.

Although still new and in the stage of rapid growth, this commercial building heating business already numbers more than 2500 consumers yielding an annual revenue of $1,250,000. The average rate is about 35c.

FIRM INDUSTRIAL

The next schedule of those which I have already enumerated is the special industrial schedule, providing for what is sometimes spoken of as firm industrial service. From the beginning of our studies made upon the introduction of natural gas we realized that the proposed surplus gas classification would not cover the entire industrial field and that a gap would remain between this class and the sort of industrial business we would be able to get on the general service schedule, a part of which had formerly been served with manufactured gas. In Southern California a number of special industrial schedules had been evolved, some subject to shut-off with different priorities over others, and one at least apparently not subject to shut-off at all. In the interest of simplicity we decided, for at least a trial period, to adhere to our general service schedule which, by the way, had been established with lower rate blocks for large volume use than found in the general service schedules in the south. Later surveys showed, however, a worth-while volume of business in the industrial field which was not suitable for shut-off classification but yet would not pay the general service schedule rates. We, therefore, decided upon the establishment of still another class rate which has been filed under the designation G-Industrial. This schedule is available to all industries for all uses except cooking, but, of course, is of no advantage except for fairly large use. Its introduction resulted in a considerable reduction to certain industrial consumers, such as coffee roasting, bread baking, and so forth, which had formerly been served on the general service schedule and had even paid manufactured gas rates.

I would like to make clear that the reason for giving these consumers this reduction was the practical matter of defining one class from another. As I pointed out in the beginning, it is necessary for practical reasons that a fairly clear line of demarcation be possible, and inasmuch as gas is used for a multiplicity of small purposes in a manufacturing plant, it was not practical to distinguish one from another, and in view of the amount of reduction involved, which was not very large, it was decided to lump it all together and give all industrial uses the benefit of the new schedules.

RESIDENTIAL HEATING

There is one other special schedule introduced only last spring, coming under this general discussion, namely, the residential building heating schedule. Residential heating is undoubtedly the largest field for use of gas, and will pay higher rates than either of the special classes discussed above. In fact, it was anticipated that the general service schedules established by the Commission's orders in 1930 would be quite low enough in this field. However, rapid progress has been made in the development of oil burners, especially automatic equipment able to handle successfully the cheaper grades of fuel oil. In order to meet this fuel oil competition a set of special schedules were filed last spring known as the G-DN series, applicable to large residential combination service.

These schedules are not new in form, being modeled upon similar ones introduced for manufactured gas in this territory just prior to the introduction of straight natural gas and also later introduced in our remaining manufactured gas territory. Residential heating has been recognized extensively as a special class for which special schedules have been made throughout the country.

The new schedules provide for house heating in combination with cooking and other domestic uses—in fact, complete residential service—on a single meter. This, of course, does not differ from the service heretofore given and still given on the general service schedule, the only difference being that the new schedules provide a lower follow-on block after the first 25,000 cu. ft. at the general rates and are limited to single family residences, this restriction being necessary, of course, to prevent large commercial cooking from getting the special rate intended only for house heating. The break point from the

general service rates to the special follow-on rate, that is, the use of 25,000 cu. ft. before the special rate becomes effective was determined by experience with competitive fuel oil and partly also by comparison with the commercial building heating schedule. The follow-on rate was made equal to the first block commodity rate of the commercial building heating schedule, and the 25,000 cu. ft. at general service rates is sufficient not only to cover the ordinary domestic use but also to cover the fixed charge element of the commercial building heating schedule.

It may be asked why we make special concessions to develop this heating business with its pronounced winter peaks. The answer is to be found in our climatic conditions. Comparing these with Southern California for example, the peaks are not so pronounced here, the load factor is much better; also because of the greater amount of heat required here in a year's time, the competition with fuel oil is much keener. So again it is the value of the service rather than its cost which has determined these rates.

CONCLUSION

In conclusion, I wish again to emphasize the general principle of class rates, and especially that such rates, when properly applied, as we believe ours have been, are of benefit to all other consumers, especially the domestic and commercial consumers. Whenever the company makes a profit by adding business to its lines, this is in no way a burden on other consumers but it is of benefit to them all. The interest of the company and its consumers are parallel in this respect. It is of great importance to all concerned that consumers should realize this and lend at least their moral support to the company's efforts to obtain profitable new business. The greater the amount of new business which the company can take on at a profit, the lower the rates at which it can render service to all consumers.

APPENDIX

Now, there is one comment I would like to make by way of foot note or appendix, and that is in regard to my use of the term "additional cost" which appears several times in what I have said. I am aware that authorities do not all agree as to the wisdom of using "additional cost" in testing rates because they sense a danger that the term "additional cost" will be misapplied, that is, that it will not include all of the additional costs. And for that reason I wish to make clear that when I use the term I have in mind all of the additional costs on a long term basis. I particularly mean that spare capacity which may be available for a particular extension to some new business can not be considered as coming without cost, if it is such as will normally be required by regular service consumers in the course of time; so that if used for the particular new business it must later be replaced by new construction. Obviously, the additional cost of the new construction in that case is a part of the additional cost which must be considered.

Before closing, I shall add just a word about the reductions that have been ordered by the Commission. "It is an ill wind that blows no one any good." If and when these reductions, a good feature will be that they are fairly promotional in character. No reduction at all has been made for the convenience user. The reduction is greatest in the house heating range, which is undoubtedly our largest potential new business field. No reduction has been made—as none was to be expected—for surplus gas, but a substantial reduction is made for firm industrial use, especially in the range of moderate consumption. The special residential heating schedules are also reduced by reason of the reduction in the primary schedules, though this has been offset in part by extending the quantity which must be used before the special block rate is reached and also by raising that block rate somewhat. Nevertheless there remains some reduction for this class also. The reductions, of course, are made primarily because of the Commission's judgment that the company's net revenue from existing rates was somewhat more than sufficient. It will be observed, however, that they in no way conflict with the principles of class rates.

Ville Platte Voting on Gas Plant

The city council of Ville Platte, La., has called an election on December 5 for a vote to permit the council to borrow money for the erection of a gas plant.

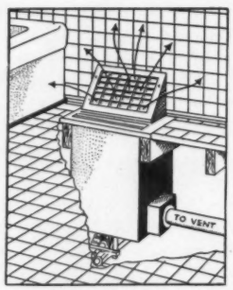
WARD WALL-HE-TOR

Economical gas heat for the bathroom

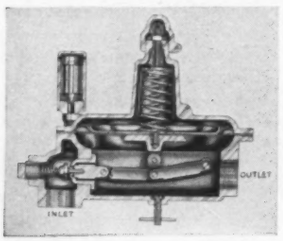
Now for the first time in gas history, a vented appliance, ornamental, and taking up little space, is available for bathrooms. This has been made possible by the Ward Wall-He-Tor, which will heat the average bathroom for as little as half-a-cent an hour, depending upon local gas rates.

Wall-He-Tors are ideal for dens, breakfast rooms, and small bedrooms. They may also be used as unit systems for houses without basements.

Write for literature, terms, and prices. Ask about Ward Floor Furnaces with Bilt-In Thermo-Control.



WARD HEATER COMPANY
1800 W. Washington Blvd.
Phone PArkway 9171 Los Angeles, Cal.



Reynolds Products—

Products for all kinds of Pressure Reduction—for either artifiicial or natural gas.

GOVERNORS—Intermediate Pressure, Triple Outlet, Holder, Toggle Type Street.

REGULATORS—High Pressure Service, Low Pressure Service, High Pressure Line, Single and Double District Station.

VALVE—Automatic Quick-Closing Anti-Vacuum,Relief, Cut-off. Model 30: manufactured for vertical or horizontal connections.

Seals: mercury and dead weight

NRA MEMBER U.S. WE DO OUR PART

Recognized Gas Control Since 1892

Reynolds Gas Regulator Co.
Anderson, Indiana
422 Dwight Building—Kansas City, Missouri
Second Unit Santa Fe Building—Dallas, Texas

THE CLIFT

SAN FRANCISCO
GEARY AND TAYLOR STREETS

540 Rooms With Bath

Rates from $3.00 single and $4.00 double

Garage Accommodations

Dining Rooms and Coffee Shop

FREDERICK C. CLIFT
President

ARTHUR L. WATSON
Executive Manager

EL MIRASOL
SANTA BARBARA

RATES
AMERICAN PLAN

For reservations
write or wire
THE CLIFT
San Francisco

LA QUINTA
IN-THE-DESERT
Five miles from Palm Springs

THREE CALIFORNIA HOTELS OF DISTINCTION

Research on Viscosity of Natural Gas

VISCOSITY is an important factor in solving many engineering problems requiring the application of fundamental theories and laws of fluid movement that confront the petroleum and natural gas industries, states the United States Bureau of Mines in a recently issued technical paper, No. 555, in which is described an apparatus and method for determining the viscosity of natural gas.

Until recently viscosity has been accorded relatively little weight in the solution of natural gas problems, and few pertaining data have been published. However, research has shown that it is frequently desirable and often necessary to have a numerical value for the viscosity of the gas under consideration.

After giving reference to the available literature on the theory of liquid and gas viscosity, the authors, W. B. Berwald and T. W. Johnson, have given a brief discussion on the viscosity of fluids; to show from the data of previous experimentors that the same general laws of fluid motion apply to an analysis of the flow of either liquids or gases; and to develop a method from these general laws of fluid motion for measuring the viscosity of natural gases sufficiently accurate and practical for use in natural gas engineering work.

Most methods for measuring the viscosity of gas are exceedingly complex, requiring highly refined laboratory apparatus and considerable skill in operation and interpretation of results. The method used by the Bureau of Mines engineers is simple in design and operation, requiring no complex apparatus or special skill.

The apparatus consisted primarily of a 10.3-inch-diameter coil of 1/16-inch-internal-diameter copper tubing 135 feet long. A small positive meter, which was calibrated frequently against a standard cubic-foot holder, was used to measure the volume of gas discharged at the outlet of the coil. The inlet pressure was measured with a 72-inch mercury manometer having a finely graduated scale; and the outlet pressure, which was held at approximately atmospheric pressure, was measured with a small water manometer. Moisture was prevented from entering the coil. The coil and meter were operated in a constant temperature bath. Operation of the apparatus consisted in maintaining uniform or steady rates of flow through the coil and observing corresponding pressures and rates of flow.

The method is based on the relationship between friction factor and the Reynolds "number" for flow of gas through circular tubing. The Reynolds "number" or "criterion" is the ratio, tube diameter multiplied by the density multiplied by the velocity divided by the viscosity of the fluid. A gas of known viscosity is used to determine the relationship for any tube of fixed dimensions. From this calibrated relationship and from the flow of natural gases of unknown viscosity through the same tube it is possible to calculate the viscosity of the natural gases. Dry

air, the absolute viscosity of which has been well established, was used as a reference gas in calibrating the apparatus.

The accuracy of the method has been checked by determinations on gases of known viscosity. The indicated experimental error from a large number of determinations of the viscosity of air was approximately (plus or minus) 1.25 per cent. Check determinations on the viscosity of nearly pure oxygen, nitrogen, and methane gave average results within (plus or minus) 1.25 per cent of the most reliable and accepted values published for these gases. Additional check determinations on hydrogen and helium also were made in the apparatus.

Viscosity determinations at 60° F. and approximately atmospheric pressure were made on 25 natural gases of widely different chemical composition. The observed viscosity of these gases showed a maximum variation of approximately 25 per cent, or from 0.00000646 to 0.00000866 pound per second-foot, depending upon the chemical composition of the gas, which ranged from a "dry" gas of almost pure methane to a "wet casing-head" gas containing mostly hydrocarbon gases heavier than methane.

Results of experimental determinations on three representative natural gases at 40°, 60°, and 80° F. indicated that within this range of temperature the viscosity increases approximately 7 per cent, depending somewhat on the chemical composition of the gas.

Experimental determinations on the viscosity of natural gas also were made at pressures as high as 500 pounds per square inch absolute. The viscosity at these higher pressures was found to be approximately the same as that observed at pressures near atmospheric.

P. G. and E. Rates Reduced in November Ruling

By decision of the California Railroad Commission for November a reduction of about $2,100,000 annually is called for in Pacific Gas and Electric Co. natural gas rates. Rates applied by the commission are estimated to yield about 6.67 per cent on a valuation of $105,000,000 for the company's gas department, or about $7,000,000 annually. The new rates will be retroactive to July 16.

The Commission refused to allow an item of $12,000,000 representing going-concern-value, the company's rate base being about $13,500,000 higher than that established by the Commission. The company's application for rehearing of the case has been denied, and no announcement has yet been made as to whether recourse will be had to the courts.

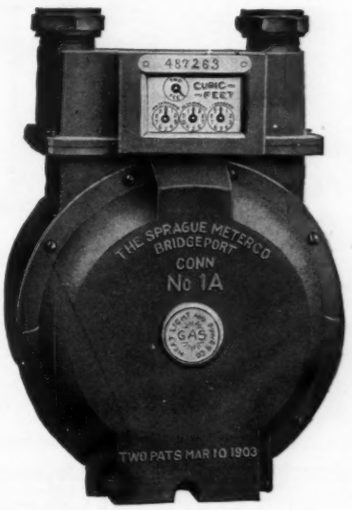
Manufactured gas rates on the P. G. and E. system were sustained by the Commission, which over-ruled several rate protests in this classification.

The company's service charge was abolished under the new ruling, and a minimum monthly charge substituted.

National Radiator Has Heater for Breaking Water Emulsions

The National Radiator Corp., Johnstown, Pa., has introduced a new type of heater for breaking emulsions of water in crude oil. A research report on the construction and use of this heater is available on request.

"MODERNIZE as you repair"



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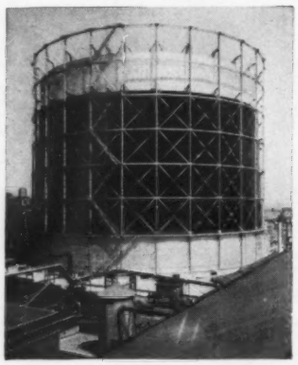

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NONFERROUS SECTION contains 92 articles—approx. 500 pages. This part prepared by Institute of Metals Division of A.I.M.E. Includes 23 articles on Aluminum, 4 on Brass, 14 on Copper Alloys, 8 on Lead, 7 on Nickel and many others on Tin, Zinc, etc.

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New Operating Set-up Brings Personnel Changes for So. Cal.

AS A result of the merger of Southern California Gas Co.'s Basin Division into other adjacent operating divisions a number of personnel changes and transfers have been made effective, among them the following:

Elting Henderson, formerly assistant general superintendent of transmission and production is now assistant general superintendent of manufacture and distribution.

Ralph L. Cook, formerly superintendent of the Basin division at Los Angeles, is now at Taft as superintendent of distribution for the Midway division.

Ralph Haun, formerly superintendent of distribution for the Midway division, is now superintendent of the Southern division with headquarters at Redondo.

LeRoy Jillson, formerly general foreman in the Eastern division, has been advanced to transmission superintendent in the same division.

V. Lewy, formerly division engineer in the San Joaquin Valley division, has been made superintendent of customers' service, a new position created in the Central division, and headquarters at Los Angeles.

H. M. Dwight, formerly office engineer to Lee Holtz, general superintendent of manufacture and distribution, takes Mr. Lewy's place as division engineer for the San Joaquin Valley division, with headquarters at Visalia.

Ed. Vill, formerly storekeeper in the Basin division, has been transferred to the general storeroom at the Santa Fe Avenue distribution building as assistant to G. C. Knox, general storekeeper.

United Gas Gate Rates Set at 32 Cents in Recent Order

An order has been issued by the Texas Railroad Commission establishing temporary rates for domestic gas at city gates on the United Gas Public Service Co.'s system, at 32 cents per M c.f. These are the same rates recently fixed for the Lone Star System, the Commission's order now being contested in the courts by Lone Star.

Lansing to Have Natural Gas

Proposal submitted by Alfred H. Doughty to bring natural gas to Lansing, Mich., was approved at a city election, November 7. A 30-year franchise is expected to be issued to the Central Michigan Natural Gas Co., now being organized by Mr. Doughty, which will allow the company the right to lay mains and lateral lines in Lansing.

Moran Corp. Gets Tomball Franchise

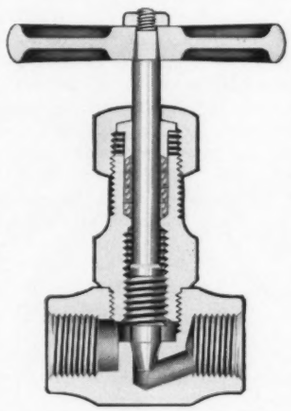
The Moran Corp., Houston, Texas, has been granted a franchise for the construction and operation of a gas distribution system in Tomball, Texas, a recently incorporated community. The Moran Corp. also serves Conroe, Texas.

Frederick L. Westerbeck Dies

Frederick L. Westerbeck, president and founder of the Columbia Gas Co., St. Louis, Mo., died November 9 of heart disease. He was 82 years old.

Crane Co. Marketing New Line of High Pressure Needle Valves

Crane Co., Chicago, Ill., has placed on the market a newly designed line of high pressure needle valves, of small and compact design, made from carbon steel or exelloy (a



high chrome, stainless iron). The valves are adaptable to high pressure gauge lines on oil service, water or gas lines, orifice meters, regulator leads and by-pass connections in power, industrial or chemical plants, in refineries, or on gas and gasoline distributing systems where high pressures at relatively low temperatures are encountered.

Practical improvements in the new line include long pipe threads, long stem threads, deep stuffing box with gland, tight metal-to-metal bonnet joint, long tapered plug disc, long bonnet thread.

Largest Gas Well in Michigan Completed

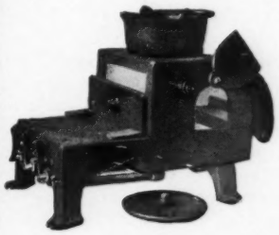
Completion of the largest dry gasser in the state of Michigan by James M. Taggart and associates, of Big Rapids, Mich., was made during the week of November 6. The well is located in Austin Township, Mecosta County, and made 25,500,000 feet on open flow. The new well proves up an area of several thousand acres, constituting the largest gas pool thus far developed in the state. Taggart Brothers have been authorized by the Michigan state utilities commission to lay an 11-mile gas line from their wells in Austin township to Big Rapids.

Lone Star Replaces 28 Creek Crossings

Due to damage from corrosion 28 creek crossings on the Lone Star Gas Co. pipe line between Gordon and Breckenridge, Texas, were replaced during the summer and fall of 1933. Each crossing requires from three to seven joints of pipe.

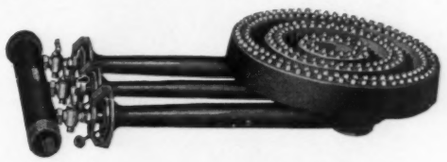
New Gas Building in Compton

At Compton, Calif., the Southern California Gas Co. has a new one-story brick-concrete district office building, the former structure having been destroyed in the earthquake of March 10. W. G. Russell is district agent for the company at Compton.



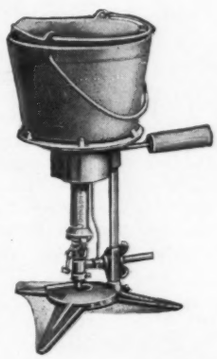
Johnson No. 118
Combination Bench Furnace

The Johnson No. 118 may be put to many practical and profitable uses. With it you may heat the largest soldering coppers. It is also designed for heat-treating, annealing, etc., and will melt up to 22 pounds of soft metal.



Triple Atmospheric Ring Burners

The Johnson 60BCE line of ring burners are designed to serve a variety of applications. Small center burner is 5 inches in diameter. Largest burner is 15 inches in diameter. Each burner has separate valve and mixing tube and may be used separately or in any combination.



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Sunbright Pipe Line Co. to Construct 80-Mile Line

Sunbright Pipe Line Co., Sunbright, Tenn., according to reports in November, has contracted for 80 miles of 10-inch pipe for a line to run east from the Sunbright fields. As planned, the line would split at Wartburg, one branch to run to Harriman and Rockwood, the other to go through Clinton, with possibility suggested of extending this branch to Knoxville. The Sunbright Pipe Line Co. is a subsidiary of the Public Service Corp. of Tennessee. J. H. Graham is president of the corporation, which holds leases on 100,000 acres in Morgan county, Tenn.

E. N. Strait Chairman of A.G.A. Rate Structure Committee

E. N. Strait, manager of the rate department and member of the operating committee of the Byllesby Engineering and Management Corp., Chicago, Ill., has accepted the chairmanship of the important Rate Structure Committee of the American Gas Association.

Crenshaw and East at Los Angeles for R.R. Commission

Carl E. Crenshaw and Loren W. East, assistant engineers in the gas and electric division of the California Railroad Commission, are now located in the Commission's Los Angeles offices, transferring from San Francisco.

Payne

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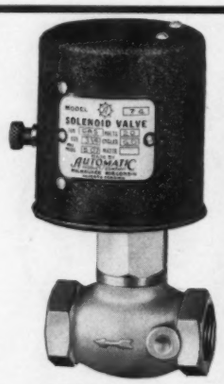


MODEL 74

Gas Fuel Endorsed for Low-Cost Housing

(Continued from Page 16)

because of lack of storage space. Gas, both artificial and natural, was regarded as preferable because no storage space is required and because it is clean and smokeless. The subsequent discussion was, therefore, concerned with individual heating plants designed for gas, including gas, steam and hot water boilers, gas warm air furnaces, as well as various types of individual room heaters such as gas radiant heaters, gas-steam radiators, gas logs, reflector heaters, and circulators.

As gas is not always the least expensive fuel the type of heating plant installed should be highly efficient, according to Mr. Valentine.

In his discussion of vented and unvented room heaters Mr. Valentine mentioned the fact that the products of complete combustion from a gas appliance of any kind are harmless since when gas is completely burned carbon dioxide and water vapor are formed, both of which are harmless. It was his recommendation, however, that all gas appliances be vented to avoid condensation of moisture on walls, windows, etc.

It was quite evident from the various papers presented at the National Conference on Low-Cost Housing that not only are gas refrigerators favorably regarded because of their low operating and maintenance costs, but gas seemed also the most desirable fuel for cooking and heating purposes. Gas is sometimes considered as being too expensive for house heating purposes but a thorough analysis of the subject brought out at the conference seemed to reveal the following advantages of gas for heating in low cost housing projects:

1. No fuel storage space required.
2. No space for ash storage necessary.
3. No expense for firing since gas appliances are automatically controlled.
4. No expense for ash removal since there are no ashes with gas.
5. High efficiency of units.
6. Susceptible to automatic temperature control with room thermostat, and time clock where desired temperature for different periods of day and night automatically maintained. Overheating with other fuels often wasteful since windows and doors often opened when overheating occurs.
7. Lower maintenance cost of units since A.G.A. approved gas appliances required to comply with national standards for strength and durability.
8. No dust, dirt, nor ashes connected with use of gas; consequently, repapering, cleaning, and redecorating costs are less.
9. There is no smoke where gas is used. Smoke not only causes millions of dollars worth of property damage in various cities each year, but is also extremely detrimental to health. This is avoided, using gas.

While most of those discussing the Federal Government's proposed housing projects were apparently sold on the advantages of gas for heating, cooking, and refrigeration, they

must be kept sold and in addition Federal Housing Authorities and local housing commissions in the various municipalities must be convinced of the advantages of gas over other mediums of heat if the gas industry is to secure the business it rightly deserves which may develop from this phase of the nation's present recovery program.

Executive Committee to Correlate Lone Star Activities

Lone Star Gas System has organized an executive committee to coordinate activities of its distributing companies. Those serving are: James B. McCabe, representing Municipal Gas Co.; Chester L. May, representing Community Natural Gas Co., Texas Cities Gas Co., and Stamford and Western Gas Co.; and Wesley L. Wright, representing the Fort Worth division of Lone Star and the Dallas Gas Co.

Members of the committee were elected at the system's Foreman-Manager meeting, upon the recommendation of Frank L. Chase, vice-president and operating manager of the Lone Star.

Dearborn Chemical Co. Publishes New Book on Protection

Following an investigation of corrosion damages in a number of factories, the Dearborn Chemical Co., Chicago, Ill., has published a book on the protection of iron and steel from rust. The book points out cases where proper protection has preserved steel equipment for extra years of service, and should be of interest to those responsible for production or maintenance. Copies of the book may be procured by writing to the company, Department F-3, 310 South Michigan Avenue.

Western Washington Yields Two Natural Gas Wells

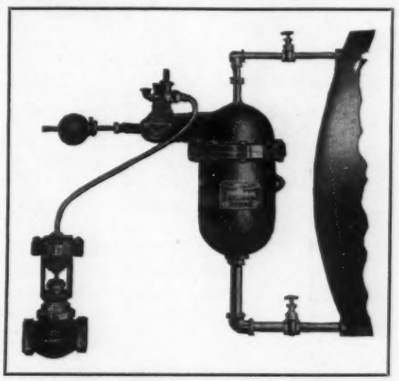
Two natural gas wells were brought in from shallow depth near Ferndale about six miles north of Bellingham, Wash., by C. S. Shippey in November. This is the first production from western Washington. The wells came in at a depth of 173 feet and the first one gauged 900,000 cu. ft. daily flow at 30 pounds pressure. Additional wells have been located, present plans calling for about 20 to be put on production, according to Mr. Shippey.

Gas Cock Industry Code Approved

A Code of Fair Competition for the Gas Cock Industry was approved by President Roosevelt on October 31, 1933. Under the code, gas cocks cannot be sold as approved A.G.A. apparatus unless they conform to standard specifications prepared by the Association of Gas Cock Manufacturers in cooperation with the Testing Laboratory of the A.G.A.

Breeland in Safety Post

A. W. Breeland, safety supervisor of Lone Star Gas System, has been appointed vice-chairman of the petroleum section of the National Safety Council.



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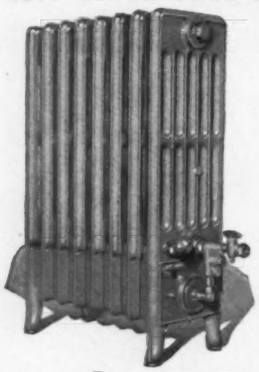

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Water Pressure Tests for H. P. Lines

(Continued from Page 13)

3-inch blowoff at Tulane Road, together with other blow-offs at high points along the line, so that gravity would remove most of the water. After the water was removed by this method the test sections were replaced with straight pipe.

The middle 12-inch line at Tulane Road Station was parted and gas pressure introduced from Linden Station. The line was given a good blow several times and all water removed. This was checked by testing drips along the line.

Test sections were then re-installed and under the direction of J. H. Lang, superintendent of measurement, odorized gas was introduced into the line and a pressure drop test (dead weight) at approximately 175 pounds made on this section of line.

The results of this pressure drop test were as follows: 481 cubic feet lost per hour, which was equivalent to 207,962 cubic feet lost per year, per mile of equivalent 3-inch main. At 100 pounds this would equal 117,682 cubic feet per year, per mile of equivalent 3-inch main, and at 200 pounds equal to 235,190 cubic feet per year, per mile of equivalent 3-inch main. As a matter of comparison the Bureau of Standards shows that a Dresser-coupled line at 100 pounds pressure having a loss of 200,000 cubic feet per year, per mile of equivalent 3-inch main, is to be considered a very good line.

The odorant used in the line for this test was Amyl-Mercaptan, which aided in locating one small hole in the pipe 7 feet underground. It is planned to make another test later using Ethyl-Mercaptan as an odorizer to see if more satisfactory results cannot be obtained.

The next step was to remove the odorized gas and put the line in service. It was thought best to send the odorized gas through the river lines where it would become diluted with a larger supply of gas and be less apt to cause service complaints. This was done by installing a by-pass across the two 3-inch blow-offs on the test section at Tulane Road and introducing higher pressure gas at Linden Station, which forced this gas on through towards the river lines.

After the odorized gas had been removed from the section under test the pressure was lowered on this section, testing equipment removed and straight pipe re-installed. The line then was filled with gas from the Linden Station, and the various stations along the line which had been removed were reconnected.

The results obtained by this test were highly satisfactory and somewhat surprising. This line probably was laid for a maximum pressure of 200 pounds, has been in service more than 20 years, and then was tested at 450 to 495 pounds with exceptionally small leakage developing. The safety of this method of testing in congested areas should commend it to further and more extensive use in locations of this kind.

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1 Compact hollow fins
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3 Large heating area
4 No flat surfaces
5 Open base
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1932 Production Shows 8 Per Cent Drop Under 1931

DURING 1932 the marketed production of natural gas amounted to 1,555,990,000,000 cubic feet, a decrease of 8 per cent from 1931. This decline was caused entirely by a general falling off in demand for industrial purposes as the consumption for domestic and commercial purposes continued to increase. The production had a value of $98,985,000 at the wells; its value at points of consumption was $384,632,000.

Exports of natural gas to Canada increased from 74,000,000 cubic feet in 1931 to 83,000,000 cubic feet in 1932, while the amount piped to Mexico decreased, being only 1,610,000,000 cubic feet in 1932, compared with 2,157,000,000 cubic feet in 1931. Imports from Canada into Montana declined from 44,000,000 cubic feet in 1931 to 38,000,000 cubic feet in 1932.

The total consumption of natural gas, production plus imports minus exports, amounted to 1,554,335,000,000 cubic feet, a decline of 8 per cent from 1931. Of the total, 529,378,000,000 (34 per cent) was used for field purposes, 385,887,000,000 cubic feet (25 per cent) was used for domestic and commercial purposes, 168,237,000,000 cubic feet (11 per cent) was burned in the manufacture of carbon black, 107,239,000,000 cubic feet (7 per cent) was utilized at electric public utility power plants, 67,467,000,000 cubic feet (4 per cent) was used at petroleum refineries, and 296,127,000,000 cubic feet (19 per cent) was used for other industrial purposes.

Further particulars in reference to natural gas production and consumption in 1932 are contained in Mineral Market Reports No. 234, recently issued by the U. S. Bureau of Mines, Petroleum Economics Division, E. B. Swanson, chief economist.

April 16-18 Convention Dates for Mid-West Gas Assn.

R. B. Searing, secretary-treasurer of the Mid-West Gas Association, has issued an announcement that the 1934 convention of the Mid-West group will be held at Sioux City, Iowa, on April 16, 17, and 18. Covered in the Association's territory are the states of Iowa, Nebraska, Minnesota, North Dakota and South Dakota. R. L. Klar of the Des Moines Gas Co., is president of the Mid-West Gas Association this year.

Municipal Plant for Halstead

Mayor E. L. Kinzer, Halstead, Kan., has called a special election, December 4, on a $30,000 bond issue to finance installation of a municipal natural gas distribution system. Surveys have been under way by the Devlin Engineering Co. of Wichita, Kan. Gas would come from the field north of Burrton.

DIRECTORY

Byllesby Engineering and Management Corporation

Wholly-owned subsidiary of Standard Gas and Electric Company

231 South La Salle Street, Chicago
New York Pittsburgh San Francisco

• HYDRAUGER •
MODERN HORIZONTAL BORING MACHINE
For Underground Installation of Pipe and Conduits. Avoids damage to costly Pavements and saves time. Send for Bulletin.
HYDRAUGER CORPORATION, Ltd.
343 Sansome Street · San Francisco, California

QUIET
GENERAL MAGNETIC GAS VALVE FEATURES:
Electric Hum Eliminated, ½-3" sizes. Low and High Voltage. Built for High Pressure Gas. Made in slow-opening types. Simple in Design—Infallible in Operation—Low in Price.
GENERAL CONTROLS CO., LTD.
1539 Folsom St. San Francisco

SHEER 31-A MOTOR GAS VALVE
Now Entering Its Third Year
LEADS IN PERFORMANCE AND LOW PRICES
Also Hi-Lo Gas Valve, Step-Opening Gas Valve, Thermostats, Safety Pilots, Limit Controls, Space Heater Regulators, Humidifiers, Etc. . . . .
WRITE FOR CATALOG
H. M. SHEER CO., QUINCY, ILL.

GAS PIPE LINE MAP
Compiled by the Editors of WESTERN GAS
Size 45" x 45"

The most comprehensive published; covers the 22 western states in detail. Gives gas fields, names of natural gas communities; sizes of pipe lines and names of pipe line companies.

PRICES:
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810 South Spring St. Los Angeles, Calif.

Welsbach
HOTZONE
STAZHOT
Hotzone Special
(Budget type)

Self-action storage gas water heaters
HAVE A CODE OF THEIR OWN
24 HOURS DAILY
REAL HOT WATER SERVICE

THEY WORK A MAXIMUM OF
168 HOURS WEEKLY

THEIR WAGE IS A MINIMUM
IN CUBIC FEET OF GAS

WELSBACH HIGHLY DEVELOPED SAFETY DEVICES ARE FURNISHED

HEATERS ARE MADE IN ALL DOMESTIC SIZES WITH 300 LB. TEST GALVANIZED OR EVERDUR TANK

APPROVED BY A. G. A. LABORATORY

PLEASE TELL US TO SEND FURTHER DETAILS

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COMPANY
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NRA MEMBER U.S. WE DO OUR PART

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The heater that smiles while it warms

FRASER

Radiant Front Console

Imagine a circulating heater with all the added advantages of a cheerful open fireplace. It is absolutely new—a revolutionary contribution to gas heating.

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Fraser Furnace Company

Stockton, California

Distributed by

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San Francisco Los Angeles

BARBER

Automatic Jet Gas

BURNERS

Illustrating No. 324-B Barber Automatic Burner installed in a round boiler. Note its simplicity of installation and the excellent scrubbing action of the flame.

TODAY is the time to cash in on Gas Conversion Jobs

Write us today for our NEW CATALOG and NEW attractive DISCOUNTS. Let us tell you how we assist with literature and co-operation that will enable you to capitalize on the demand for BARBER Automatic Heat.

The Barber Gas Burner Co.

3702 Superior Ave. Cleveland, Ohio

Republic Steel Corp. Announces New Enduro Chromium Steels Booklet

Republic Steel Corp., Massillon, Ohio, announces a new booklet on Enduro 4-6 per cent Chromium Steels. According to information given in the new booklet these steels possess resistance to corrosion, acid attack and scaling at elevated temperatures sufficient to render them well adapted for a number of applications, particularly in the oil refining industry. The steels can be rolled, formed, drawn, forged, welded or riveted into almost any shape desired if certain precautions are observed during handling. They are available in all the usual forms, such as sheets, plates, hot and cold rolled strip, bars, etc. Copies of the booklet may be obtained by addressing the company in care of the Central Alloy Division.

International Petroleum Exposition Scheduled in Spring of 1934

The International Petroleum Exposition will be held in Tulsa, Okla., during the spring of 1934, probably in the month of May. This decision was announced by W. G. Skelly, president of the Exposition, as a result of a recent meeting of the directors of the organization and representatives of manufacturers and distributors of petroleum equipment. W. B. Way is general manager of the Exposition.

Citizens Gas Co. Completes Line Extension to Oakwood, Mo.

Citizens Gas Co., Hannibal, Mo., has just completed piping three miles of 2-inch and 3-inch welded steel mains in Oakwood, an outlying section of the city of Hannibal. The extension will serve 280 homes with dry natural gas at 25 lbs. pressure. Individual regulators are used on each service. C. E. Fox, superintendent of the company, was in charge of the construction work.

Gas Service Co. Moves to New Headquarters

The Gas Service Co., Kansas City, Mo., announces new location of the company's general offices in the Scarritt Bldg. Remodeling work in the building is already well under way, and it is expected the company will be ready to transact business in the new location by January 2. The entire 7th floor and considerable space on the 6th floor of the Scarritt Bldg. will be occupied by The Gas Service Co.

Carbon Black Plant for Dudley Ridge

Commonwealth Consolidated Gas., Ltd., Los Angeles, Calif., has under construction a carbon black plant several miles north of the limits of the proven Dudley Ridge gas field. The plant will cost $125,000, and will have a capacity of 20,000 pounds of carbon black per day, using 500,000,000 cu. ft. of gas daily. H. R. Snyder is president of Commonwealth Consolidated and L. B. Dapron vice-president and production manager of the company.

Classified Advertising

Classified advertising five cents per word; minimum $2.00 per insertion. Situation Wanted advertisements up to 50 words will be published three consecutive issues without charge. Small professional cards 1-in. deep by 21 ems wide are $6.00 monthly on 12-time contract.

Situations Wanted

Situation wanted by gas engineer, technical graduate; 34 years old; 10 years with affiliated holding and operating companies. Experience covers high and low pressure distribution and transmission, coal and water gas manufacture, natural and refinery gas distribution; particularly experienced on unaccounted-for gas problems. References. Address Box 241, *Western Gas,* 810 South Spring St., Los Angeles, Calif.

Accountant — Bookkeeper. Over twenty years practical experience. Can take complete charge. Furnish financial and co-related statements. Also Federal Taxes. Any location. Very moderate salary. Address Box E-237, *Western Gas,* 810 South Spring St., Los Angeles, Calif.

Situation wanted by young man skilled in business management, accounting and auditing. Highest references can be furnished as to character, integrity and ability. Address Box 243, *Western Gas,* 810 South Spring St., Los Angeles, Calif.

Situation wanted by gas manager and engineer. university graduate; 22 years in all branches, water gas, coal gas, oven gas, natural gas, high and low pressure distribution. Address Box 239, *Western Gas,* 810 South Spring St., Los Angeles, Calif.

This Month's Cover

WE ARE fortunate this month in having for our front cover one of the most interesting examples of gas company advertising material to come our way for many months. This scene featuring the modern gas range, set against a Dutch windmill background and given a human touch with the aid of two attractive Dutch misses, is the work of John H. Hartog, manager of the Portland Gas & Coke Co.'s new business department. It was especially posed by two chorus girls from the Fox Theatres for use in a gas company advertisement in Portland, Ore. dailies.—*Editor.*

DEALER LETTER NO. 4

PACIFIC GAS AND ELECTRIC COMPANY
245 Market Street
SAN FRANCISCO, CALIFORNIA

Gentlemen:

This company, as you know, conducts its major campaign on GAS heating equipment during the fall and winter months.

The 1933 campaign is now in full swing. It calls for a newspaper schedule of more than 5,000 advertisements. Every day new prospects are being created.

In 290 newspapers and in the "reminder" advertising mediums that back them up, we are inviting these prospects to dealer stores.

At least one of these newspapers serves your community. TIE IN! Tell its readers that "See Your Dealer" means see YOU.

Mr. A. J. Hall, advertising manager of the Petaluma Argus-Courier says: "Petaluma dealers who TIE IN are helping themselves to a much larger program of advertising than they actually pay for."

Petaluma dealers must feel the same way about it because the pages of the Argus-Courier are literally crammed with TIE-IN advertising all year 'round.

Colder days will soon be here. Start now to sell your neighbors on the particular makes and prices you feature while we sell them on the convenience, cleanliness, and economy of Gas heating equipment in general.

Sincerely,

H. M. Crawford

General Sales Manager.

YOUR TIE-IN AD HERE
TELLS PROSPECTS THAT
YOU SELL
THE APPLIANCES ADVERTISED BY
P·G·and·E·

WG-212-1233

OR

PERFORMANCE?

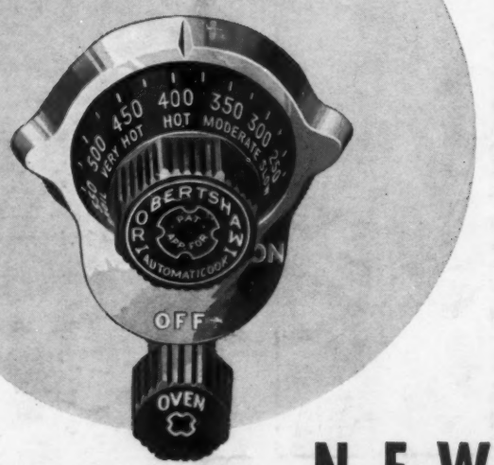
PRICE raiding has no place in the New Deal. Quality has . . . the place of honor . . . and quality is always another good word for performance. Quality . . . performance . . . service . . . they are the fundamentals for business progress from now on.

And this turn of events is mightily in favor of the dealer who makes sure that the gas ranges he handles are Robertshaw equipped.

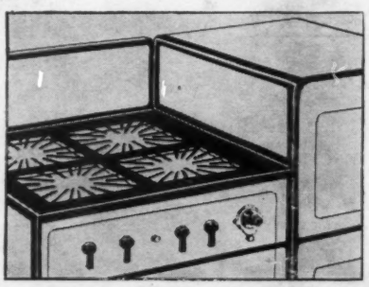
For then he has the finest of all *performance* features to talk about and demonstrate . . once a woman knows what a Robertshaw oven control means in her life, she has a very real reason for wanting a new range.

Thirty years of gas thermostat making is in back of the Robertshaw . . . thirty years of dependable production by thermostat experts, precision workers free from sweatshop conditions or any other price fighting tactics. The "GO" sign is riding high in your gas range department when the ranges are fitted with Robertshaw oven controls.

ROBERTSHAW THERMOSTAT COMPANY
YOUNGWOOD, PA.



NRA MEMBER U.S. WE DO OUR PART



NEW

Model "FC" Combination Thermostat and Oven Valve. Both units—grouped together for convenience and attractive design—are entirely separate in operation and adjustment.

FOR TABLE TOP OR CONSOLE RANGES

ROBERTSHAW

"AutomatiCook"